ETERNITY

ERNST HAECKEL

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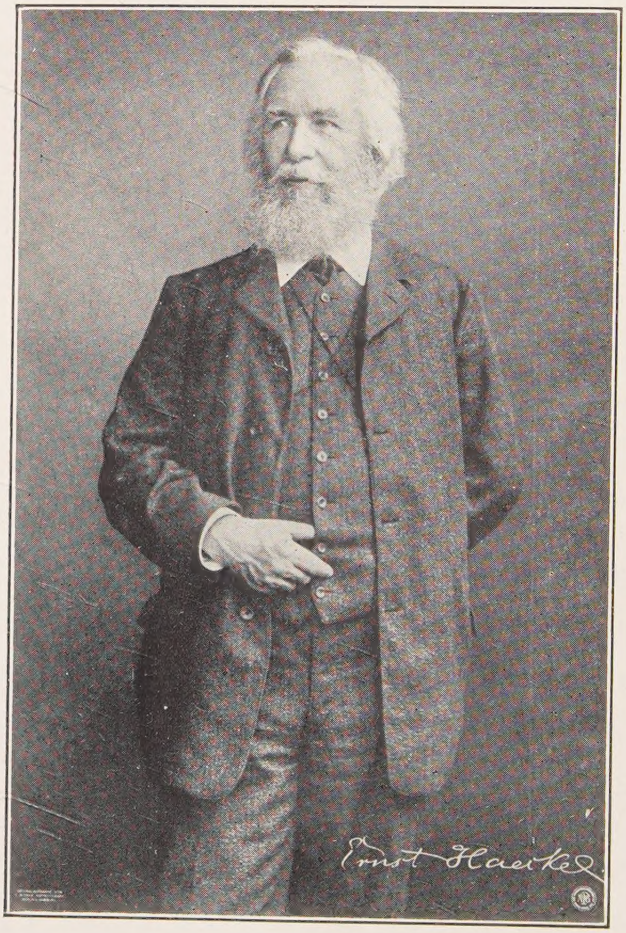

Ernst Haeckel.

ETERNITY

WORLD-WAR THOUGHTS *on*
LIFE *and* DEATH, RELIGION,
and the THEORY *of* EVOLUTION

BY

ERNST HAECKEL

TRANSLATED BY
THOMAS SELTZER

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"Nature eternally creates new forms; what is, never was; what was, never will be again. Everything is new and yet it is the old.

"Nature seems to have done all for individuality and yet cares naught for the individual. She keeps perpetually building and perpetually destroying, and her workshops are inaccessible.

"There is eternal life, becoming and movement in her; and yet she does not advance. She changes perpetually and is never at a standstill. She is firm; her step is measured, her laws unchangeable.

"Everything is ever-present in her. She knows no past, she knows no future. The present is her eternity."

GOETHE, *Nature*, 1780.

PREFACE

During the last fifteen months we have been passing through a tragedy of unexampled magnitude and horror. The "World War" or the "War of the Nations," which at its commencement in August, 1914, transformed half of Europe into a bloody battlefield, soon spread over the whole face of the globe and drew every civilized nation, directly or indirectly, within its sphere of suffering. Millions of human beings have already fallen victims to this terrible international slaughter, and billions of values of all kinds have been swallowed up. All the treasures of higher culture that humanity has accumulated through the laborious efforts of thousands of years seem to be endangered, and the unloosed passions of the nations tearing each other to pieces threaten to plunge the world back into barbarism.

The singularly complicated nature of all the social and international relations which are the necessary consequences of this "Great War" brings us daily face to face with new cares and with new important problems. But none of these touches our emotions so deeply and directly as the

sudden change from life to death. Every day the newspapers print long lists of promising young men and devoted fathers who have sacrificed their lives for their fatherland. Naturally people on all sides begin to inquire, "What is the meaning of life?" "Is existence eternal?" "Is the soul immortal?" The answers to these questions are sought by some in religion, by others in science, and they will vary greatly according as these highest problems of the human intellect are judged from the monistic or the dualistic point of view.

As an old teacher of the natural sciences, accustomed for half a century to apply the standards of the modern theory of evolution to all phenomena, I have also endeavored to explain this world war, the most stupendous and bloodiest of all the wars fought thus far, by the laws of natural evolution. The most important problem of evolution is that of the descent of man from the primates. From the point of view of my special subject, comparative zoology, I regard this question of questions as definitely solved, and I find that this solution leads directly and surely to the monistic conception of all natural laws, and to the true estimate of "eternity."

During this past year I received many letters, chiefly from former students of mine and men of

my way of thinking, who are either still in active service at the front, personally experiencing the horrors of the world war, or are lying wounded in the hospitals bearing its ghastly consequences. It was these letters that moved me directly to the publication of the following views, which I presented more fully in my former natural-philosophical works. May those who sought my opinion find a satisfactory answer to their questions in the *World-War Thoughts,* and that consolation which our rational Monism affords as the "connecting link between religion and science."

ERNST HAECKEL.

Jena, Germany, October 20, 1915.

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CHAPTER I

THE WORLD WAR AND NATURAL LAW

The Value of the Laws of Nature—The Unity of the Cosmos—Eternity and the Law of Substance—Eternity of Matter—Eternity of Energy—Eternity of the Psychom—Eternity of the Spirit—Eternity and Impermanence—The Beginning and the End of the World—World War and Chance—Chance in Personal Life—Chance in the World War—Chance in Organic Life—Chance in Anorgic Life—Chance in Cosmic Life—World War and Providence—The Value of Human Life—The Over-estimation of Human Life—The Under-estimation of Human Life—The Meaning of Human Life—Life and Death—Voluntary Death and Self-redemption—Spontaneous Generation (Archigony)—The Fear of Death.

THE VALUE OF THE LAWS OF NATURE.—The important basic position occupied by science in modern civilization is due to its recognition of the unity of natural phenomena in their infinite diversity and to its reduction of all phenomena to definite laws of nature. The knowledge of these laws reveals the causes of observed facts. The most

general law, therefore, is the law of causation, the universal sequence of cause and effect. This causality is the formal expression of the material law of substance which dominates all events and all being in the universe. The true causes lying at the basis of all things are direct mechanical causes, efficient causes, not conscious, purposive causes, or final causes. The latter are operative only in a part of organic life and are reducible to the former.

The most general laws of nature, for example, gravitation and chemical affinity, are absolute and hold true of the entire universe. Modern astronomy, especially astrophysics and spectral analysis, has demonstrated that these universal laws are as fully operative in the remotest spaces of heaven as in the limited region of our own planet, the earth. We must ascribe eternity to them, since all processes in the evolution of the celestial bodies as in that of the terrestrial organisms are conditioned by the same laws. These constant laws of nature are therefore quite different from the variable laws of the state, which prescribe the rules of conduct for each individual in human society, such as ethical laws, religious laws, social laws, and so on. These are made by legislators; the natural laws are not. The great importance attached to the laws that are perfectly known and

understood is due to the logical security which they give us. They satisfy the demand of the human intellect for the causal nexus, and so place the monistic science on a solid foundation.

THE UNITY OF THE COSMOS.—All considerations of the universe and of the laws that govern it must be preceded by a clear understanding that this universe is one, all-embracing whole, and that the concept "world" in the widest sense is equivalent to that of "nature," or *"physis."* In the following discussion we proceed from the monistic principle that nature in its widest sense embraces all that we know of from experience and all that we can form any idea of with our human intellect. Hence we exclude from our scientific discussion the so-called "supernatural," especially, the "spirit world." The vast number and variety of stories about spirits or about the "higher powers" standing above or outside nature, which for centuries have played so large a rôle in the traditional myths and religions of the nations, all belong to the fancy realm of poetry. The "ideal world" beyond, which the dualistic philosophy opposes to our "real world" here below, is likewise nothing but a product of metaphysical speculation eluding the grasp of strictly scientific thinking. There is no other basis for the assump-

tion of an imaginary superterrestrial world on the other side as opposed to our real terrestrial world on this side than old, old mystical conceptions unsupported by the slightest evidence derived from experience.

Eternity and the Law of Substance.—Our monistic natural philosophy regards the law of substance as the supreme and most general law of nature; all the other laws are subordinate to it. It is universally operative in space and time and is therefore eternal. I have discussed fully this all-comprehensive, fundamental cosmological law in the twelfth chapter of *The Riddle of the Universe,* calling particular attention to the fact that two different laws are comprehended and unified in that law. The older law is that of the conservation of matter, which the French chemist Lavoisier established in 1789. The younger law is that of the conservation of energy propounded fifty-three years later by the German physician Robert Mayer of Heilbronn. The fundamental and universal significance of these two laws is now generally acknowledged and taken for granted, the one in chemistry, the other in physics. But the necessary connection between these two laws is still disputed in prominent circles. The difference in the point of view depends on

whether one accepts the monistic philosophy and holds matter and energy to be inseparable and united, as in Spinoza's concept of substance; or whether one believes in the dualistic principle that a part of the energies, the spiritual energies, are supernatural and independent of matter. This question of the unity of matter and energy, which is the basic principle of the "Philosophy of Identity," is of fundamental importance. The consistent monist is bound to affirm it, as the dualist is bound to deny it. *

Eternity of Matter (Indestructibility of matter—The fundamental law of chemistry).—

* In my essay, *Monism and Natural Law* (1906), published in the first volume of *Building-Stones of Monism* (1914, pp. 51-105), I refuted the attacks of dualistic philosophy upon the law of substance; and in the same volume (pp. 147-157) I restated the extension of the concept substance first propounded in my Magdeburg address in 1912 (*Energetics and the Law of Substance*), according to which, sensation, like force and matter, is to be regarded as a general attribute of all substance. The general law of conservation or constancy is thus to be extended by adding the universal conservation of the world-soul (= constancy of the psychom) to the conservation of force and matter. The third synoptic table of my *God-Nature* (1914, p. 66) gives a graphic view of this "trinity of substance." The adjoining table presents the "three fundamental aspects of the theory of substance" in parallel (1. World-Substance = Matter; 2. World-Force = Energy; 3. World-Soul = Psychom).

The materialistic principle of monism, the constancy of matter, is based on the conviction that the material substratum of all phenomena, even of so-called mental and spiritual phenomena, is space-filling matter. To understand this we must obtain a clear conception of matter. Its chief property is that of extension and of filling up space. Moreover, we can conceive of the cosmic space, extending in all three dimensions, length, breadth and thickness, only as unlimited, although our senses are incapable of clearly picturing this infinity of space.

Two thousand four hundred years ago the great Anaximander of Miletus, one of the oldest and farthest seeing of the Greek natural philosophers, taught that the Infinite (*apeiron*) is the origin of all things, and that all phenomena are derived from it through the constant change of two conditions. Formerly most physicists assumed that the largest part of cosmic space is empty and the tangible and ponderable bodies floating in it influence each other by "action at a distance." This idea has now been largely abandoned, ever since recent researches in electricity, especially those of Heinrich Hertz (1888), brought out the fundamental significance of electricity and of ether as its substantial carrier.

Since then most physicists have assumed that

by far the larger part of the world space is filled with ether (luminiferous ether or cosmic ether), and that this extremely attenuated substance is imponderable. The rest of space is filled with heavy masses, with ponderable matter. Ponderable matter is composed of separate little particles known as molecules, and these again of atoms, particles of matter so small that they cannot be divided further chemically. Many modern physicists assume an atomic structure for imponderable ether also; others believe (with greater probability) that the cosmic ether is not composed of atoms but is continuous, and that it not only fills up the so-called empty space, the vacuum, but also the spaces between the atoms and the molecules. But on these questions of the relations between ether and matter, especially the relation of the two primal substances to electricity (the nature of the electrons) the views of physicists are still widely divergent. (See *Riddle of the Universe,* chapter xii.)

The Eternity of Energy (Indestructibility of force—The fundamental principle of energetics).—The dynamic or energetic principle of our monism, the principle of the constancy of force, forms the basis of the assumption that all the phenomena of the universe are referable to the

actions of one and the same attribute of substance—an all-prevading cosmic force (energy or *dynamis,* formerly called simply "force" by analogy with the action of our muscles).

This energy appears in two different forms, which are being continually changed into one another, potential energy at rest, and kinetic energy in motion. Potential energy, or energy of position, is the latent capacity of a body to do work. Kinetic energy, or energy of motion, is the energy of a body at work, actual energy as opposed to potential energy. Though applied to inorganic matter it is designated in physics as "living force," the very term used in the physiology of organisms. This expression is significant, as it recognizes the essential unity of organic and inorganic matter in relation also to the universal concept of *life.* All bodies, all space-filling things, seem "living" when they are in motion, but "lifeless" when at rest. But the sum-total of energy in the universe remains unaltered when one form passes into the other in the reciprocal change that is continually going on. Inasmuch, however, as the universe is infinitely large, the force it contains must also be regarded as acting eternally. According to the latest advances in physics (especially in electricity and astronomy), it seems highly probable that the universe

as a whole is never absolutely at rest, but always in relative motion. (Movements of the stars, molecular motion and so on.) While a part of the substance keeps its potential energy at rest, the other part acts on its surroundings as kinetic energy. But the universal law of the eternity of matter holds good always.

The Eternity of the Psychom (Indestructibility of the World-soul—The fundamental principle of psychomatics).—The psychologic principle of our monism, the constancy of the world-soul, is based on the assumption that all phenomena in the life of the world, in inorganic as well as organic nature, are connected with a certain inner feeling or a kind of sensation which gives the different parts of matter an unconscious perception of their environment, of the outside world. This "soul" in matter is shown most clearly in the fundamental law of chemistry, called chemical affinity. When two different elements, A and B, mutually attract each other and combine, while behaving quite indifferently towards a third element, C, their conduct can only be explained as a discrimination between the different qualities of A, B and C. Twenty-four hundred years ago Empedocles of Agrigentum traced all the various phenomena of nature to

"love and hatred of the elements," to the mixing and separation in the most diverse forms of the qualitatively different elementary substances. The sensation (*aesthesis*) which at contact of A and B produces a feeling of pleasure—positive tropism—but a feeling of displeasure at contact of A and C—negative tropism—gives rise in the first instance to inclination or attraction, and in the latter, to resistance or repulsion.

The same sensation is displayed in crystal formation, when a crystal deposited from a saturated solution will, on the introduction of a crystal of the same composition, attach itself to it, but not to a crystal of a different composition. And just as in chemical affinity the body is attracted by the sense of the quality of the mass with which it comes in contact, so in the case of gravitation the pull seems to be induced by the sense of the quantity of the attracting mass.

The Eternity of the Human Soul (Immortality of the human personality).—"I believe in the Holy Ghost, the resurrection of the flesh and an eternal life." The reformer Luther clinches this extravagant confession of faith in the third article of his catechism with the solemn Hebraic formula, "Amen," and explains it further as follows: "I believe that on Judgment

Day the Holy Ghost will awaken me and all the dead, and will give me and all the believers in Christ eternal life."

It is well known that this mystical article of faith still plays the greatest rôle in the ideas of the lower and higher classes of society, almost as great a rôle as two thousand years ago. Especially now, when the cruel world war is raging, and millions of men face death daily, the question continually presents itself to them, "When my body dies will my soul die, too? Or is the soul, as the church and the dualistic philosophy affirm, an immortal immaterial entity which continues to live forever even after the destruction of the body?"

I have made an exhaustive critical examination of this widely disseminated dogma of athanatism (often regarded as the highest possession of the Christian faith) in the eleventh chapter of *The Riddle of the Universe,* and called it "the impregnable citadel of superstition." I have there shown that this dogma belongs wholly and entirely to the boundless realm of religious poetry. Modern science, and its surest foundation, the doctrine of evolution, cannot recognize the truth of this mystical article of faith. Physiology, whose province is the study of life itself, refutes the belief in immortality as positively as the

study of the comparative psychology of man and the other vertebrates. So also does the history of the development of the brain and its functions. The immaterial soul is nothing but a function of that organ, the work of the material brain. Pure reason cannot possibly admit the idea of the eternal duration of the soul.

The fact that belief in it has nevertheless persisted to the present day is due in the first place to the power of tradition and the sanctified churchly creed, and secondly to the comfort which the athanistic faith is actually able to afford the oppressed spirit, especially by the hope of a "future life after death"; of once more seeing our dear relatives and friends whose society we enjoyed in this vale of tears. Unfortunately this precious belief in immortality is no more than a beautiful dream, an empty promise with no guarantee of fulfillment. No empirical data have ever been furnished in proof of athanatism.

The Eternity of the Spirit.—The concept spirit shares with many other general concepts, such as world, soul, life, God, and so on, the disadvantage of possessing a variety of meanings. One's ideas of it differ according to linguistic usage, academic tradition, and the degree of one's education. In the fourteenth chapter of *The*

Wonders of Life I have considered the most important problems of the spiritual life from the monistic point of view, based on modern physiology and the theory of evolution. For our problem of Eternity we must distinguish between the following conceptions of the spirit:

I. Regarded as World Spirit, or as the supreme unifying "spiritual principle," it is equivalent to the concept energy and psychom; it includes both these attributes of substance (*The World as Will and Idea,* Schopenhauer; *The World as the Evolution of the Spirit,* Noiré; *The World as the Thought of God,* many mystics). Just as we regard substance itself as eternal so we must also regard its attributes, energy and psychom, as eternal.

II. The Divine Spirit regarded as the First Cause of the universe is variously conceived according to the different philosophical conceptions of God. Monistic pantheism, which teaches that God and the world are one (Spinoza, Giordano Bruno, Goethe), must assume the eternity of this divine spirit. Ontheism, which believes in an independent God, ruling the world he has created, also claims eternity for this scholastic God, but not for the world.

III. The Trinitarian doctrine usually regards the so-called Holy Ghost as eternal. In the dog-

ma of the Christian triplotheism (the contradictory "divine unity" made up of three persons) he is represented as the third person of the "three-in-one" God. But the Gospels leave us in doubt as to whether Christ (the second person) was begotten by the "immaculate Virgin Mary" through the Holy Ghost, or God the Father (the first person). Generally all three persons are represented as eternal, although Jesus is supposed to have received his existence only one thousand nine hundred and fifteen years ago by a miraculous conception. The material embodiment of the mysterious Holy Ghost in the form of a dove (as often pictured even by the early Christians) recalls, by comparative mythology, the analogous ancient Greek myth of Leda and the swan.

IV. According to the scientific conception of monism the human spirit is either identical with the human soul, or is regarded as a special higher part of the soul activity. In either case it is a function of the phronema, the organ of thought in our brain. With the destruction of the brain at death, therefore, it, too, perishes.

V. The mystic conception of dualism and metaphysics, on the other hand, teaches that the human spirit is a special, supernatural being which

continues to live forever even after the death of the individual (Where? How?). Spiritism and occultism and ghost-seeing (pathologic illusions) all have widely different conceptions of the eternity of "spirits."

VI. The spirits of the dead which the poetic fancy of the primitive peoples has made to live in the most diverse forms after death, are also usually represented as eternal. In many myths, however, they are enabled later to enter "into eternal rest," that is, to disappear.

Eternity and Impermanence.—In apparent contradiction to the all-pervading law of substance, namely, that the universe is eternal, is the great natural law that each separate part in it is impermanent, that individual things are limited in duration.

The reason for this contradiction is that all individual forms are limited in time and space and dependent on the outside or surrounding world. The whole cosmic process is an eternal "becoming and passing away." Each individual, each single form of substance, occupies only a part of infinite space and exists only for a fraction of eternal time. Pythagoras and his school were wrong in assuming that form is the essence of all things and that number is the true

substance. Evolution does depend, however, on a constant change of form, a metamorphosis of the individual parts.

The number series is infinite; no matter how far we continue it into infinity we can always add other units to the last number. In the same way we can think of time only as limitless eternity; by however much we multiply the millions and billions of years, we can always add to them still other years and light years. Space, likewise, is boundless; extend it as far as we please in all three dimensions, we can find no limit to it. The human mind keeps on asking: "Is there no space beyond, whether empty or filled with substance?"

The recent speculations of higher mathematics (said to be the most exact science) would have us believe that time is only the fourth dimension of space. But simple common sense refuses to accept a notion so contrary to all our experience. It rebels against it just as it does against the extreme excrescences of the much-admired modern "theory of relativity," which some (for example, Leo Gilbert) call "the latest fad in physics." In a certain sense, to be sure, all things are relative in this infinite world in which only the concept substance forms the absolute. But all the individual manifestations are merely transitory parts of the eternal substance. If, as many of the

newer physicists maintain, the world can be imagined only as a "closed circumscribed system," then we are brought to the amazing spherical "balloon" world of the Russian physicist Chwolson. I have given my views on these speculations in the second article of my *Building-Stones of Monism* (*Monism and Natural Law,* 1914).

The Beginning and the End of the World.—The old, old, but ever-recurring question of the enigmatic beginning and dreaded end of the world requires first of all a clear determination of the meaning of the ambiguous concept "world." The universe (cosmos), according to our conviction, is eternal in the widest sense. It has neither beginning nor end, but is a continuous metamorphosis, a never-ending periodic cycle, a real *perpetuum mobile.*

As against this, many physicists put the intricate law of entropy, and its corollary, the "dissipation of energy." According to this law the whole cosmos, after having run its course of evolution, will come to a complete standstill through "heat-death." This so-called "second cardinal thesis of the mechanical theory of heat," propounded by Clausius, contradicts his first cardinal thesis, the "principle of energy" (our law of substance). According to the first principle "the

energy of the universe is constant"; while according to the second principle "the entropy of the universe tends towards a maximum," towards the "heat-death." If this theory were true, we should have a beginning corresponding to this assumed "end" of the world, with a minimum of entropy. We should have a supernatural "Creator" who "in the beginning" created the world out of nothing.

The conclusions this assumption gives rise to are so absurd that it has recently met with stronger opposition from many philosophers. It has been shown especially that the "radiation pressure" and other (as yet imperfectly known) cosmic phenomena eliminate the deleterious effects of entropy. However, with respect to the separate parts of the universe the principle is certainly operative. It is assumed with good reason that our earth, like other cosmic bodies, will reach an end through heat-death. This hypothesis is as probable as that of the origin of the different cosmic bodies through mechanical causes. But, despite the astounding progress in astrophysics and cosmogony, we know too little as yet of the complex processes of the whole world structure and of the changes of the forms of its separate parts to reach any definite conclusions. The most probable hypothesis assumes an

eternal cycle of the evolutionary process of the universe with the birth of millions of stars, alternating periodically with the extinction of millions of stars. Zehnder has recently drawn in detail such a picture of the universe. Similar cosmic representations were made by those wonderful old Ionic natural philosophers, Anaximander and Anaximenes, two thousand years ago.

World War and Chance.—The old question of the significance of chance in the scheme of the universe is forcibly brought home to us every day by the kaleidoscopic events of the present world war. If we have emancipated ourselves from all mystical notions and acquired prejudices, our answer, on a sober, objective consideration of the facts, must be that chance plays an extremely great rôle. I use the word chance here in the sense in which I have explained it at the conclusion of Chapter XIV of *The Riddle of the Universe.*

The law of causality teaches us that every phenomenon has its mechanical cause; but the simultaneous occurrence of two or more phenomena which were not in causal relation to each other produces new events which can only be designated as "chance," or accidental. It is easy for the impartial observer to convince himself daily of the

power of chance even in ordinary every day life. In favorable instances we call it luck, in unfavorable ones misfortune. Now, this war of the nations keeps bringing out the element of chance more strikingly and drastically. Every day millions of shots and shells from cannon, guns, and machine-guns fly through the air and destroy thousands of blooming young lives. Every day thousands of wounded in the hospitals and thousands of prisoners in detention camps suffer from the heavy blows of blind chance. Every day thousands of human beings are ruined physically or morally through the chance, but unavoidable, consequences of the reciprocal murder of the nations.

How in such circumstances is it possible to believe that a loving Father, a wise Providence, guides the destinies of all individuals at all times?

Chance in Personal Life.—From the beginning to the end, from the cradle to the grave, the fate of every human being, like the fate of every other animal, is subject to blind chance. Everywhere we see a man's individual development conditioned by a thousand external causes, by his changing relation to countless objects in the outside world. Blind chance begins its mad play the very moment a person commences his

individual existence, the moment of his conception. Millions of tiny sperm-cells moving actively in a drop of the father's seminal fluid swarm about the mother's egg-cell which has left the ovary, ripe for fertilization. Only one of these sperm-cells succeeds in penetrating the body of the spherical egg-cell, a particle so minute as to be scarcely visible to the naked eye. But the individual distinctions are already contained through heredity in the chemical composition of the protoplasm of the two copulating sex-cells, and they determine the development of the newly conceived child. Children of the same parents, as we all know, differ greatly in their physical and spiritual characteristics, despite certain common family traits inherited from parents and grandparents. Of twelve children of the same parents, two may be highly gifted, three or four defectives, and the other six or seven average. It is merely a matter of chance which one of the millions of sperm-cells has penetrated the egg-cell and which of the thousands of the egg-cells of the ovary has first been fertilized.

Every thinking man knows how one's bodily and spiritual development is influenced from earliest childhood by the accidental conditions of one's family life and school education and one's association with brothers, sisters, and acquaint-

ances. The important step in a man's life, the choice of a profession, which decides his whole subsequent career, and later his choice of a wife, his relation to numerous other persons with whom he comes in more or less close contact, make up through thousands of chances the course of an individual's life, which in the case of the modern civilized man seems so infinitely complicated.

So, then, to hear the dualistic adherents of an ideal conception of the universe speak of a "higher guidance of our destinies by a wise Providence," or of the "kind guidance of a loving Father," and so on, may be very edifying and pleasant; but we ask how are we rationally to reconcile these beautiful poetic fancies with the hard truths and realities of human existence. The comforting promise of an eternal life after death is absolutely without foundation.

Chance in the World War.—Never before has the thinking man felt so strongly the dominant force of blind chance as in the colossal tragedy of this world war. Day after day, for fifteen months now, chance has been threatening the life of thousands of hale and sturdy men, who in the tumult of battle are every moment exposed to death.

The horrors of the bloody fighting in the trenches, in the storming of fortifications, in the open field of battle, or in the new forms of naval warfare with ironclad fleets and submarines, or in the unheard-of forms of aerial warfare with Zeppelins and aeroplanes, are brought home to us every day in the newspaper accounts and the official communiques. Thousands of pictures, photographs, and sketches from the theatre of war make the printed accounts live for us.

A single grenade or a single bomb, whether well aimed or hitting by accident, a single shot from one of the huge modern rapid-firing guns, may cruelly destroy dozens of human lives in a second. On the other hand, some soldiers may be saved by a lucky movement, or a favorable position, or a chance shelter, while comrades right beside them may be killed. The reports of our military doctors, especially at the surgeons' congresses, are full of astonishing cases of curious, often incredible injuries. Soldiers wounded in the most delicate parts of the body, with bullets penetrating into their brains, hearts or intestines, with arms and legs crushed, come out of it all alive and are cured in a longer or shorter period. Others only slightly wounded die in consequence of accidental blood-poisoning or improper treatment. Some soldiers who have

fallen amid a violent shower of bullets show more than a hundred wounds in their torn bodies.

And how differently blind chance treats the wounded, especially the prisoners, later on! The transportation they get, their treatment in the hospitals and in the detention camps and so on, is all a matter of great importance, and yet is all a matter of chance. And how chance now daily plays its thousands of pranks with the millions of mourning families, anxious mothers, women and children, whose sons, husbands and fathers are at the front, and from whom they often receive no news for weeks and months!

Never, as long as suffering humanity has existed on this "bungled planet," has the wholesale misery of war and the fatalistic dominance of blind chance shown itself in such vast proportions and in such cruel forms as in this awful world war.

Chance in Organic Life.—Blind, unconscious chance plays the same decisive rôle in the life of every organism as it does in the personal life of the human being. It is as much a factor in the development of each individual (ontogeny) as in the evolution of his historical ancestral series (phylogeny), in the life of the one-celled protists (protophytes and protozoa) as in the

many-celled and tissue-forming histona (metaphytes and metazoa).

The whole wonderful history of the descent of the organisms, which I have tried to sketch in my *Systematic Phylogeny* (1866-1896), depends upon the non-purposive interlacing of myriads of chance events, each one of which is conditioned, on the one hand, by its countless relations to the external world (adaptation) and on the other by the inbred characters transmitted by the ancestral series (heredity). The historical evolution of thousands of plant and animal species on our planet which have become differentiated in the course of thousands of millions of years, but all of which have descended from only a few very simple parent forms (the oldest from a simple primitive cell), is the product of an endless play of historical events, each of which in turn is the mechanical, non-purposive result of countless accidents.

The other branch of biogeny, embryology, may on a superficial view, perhaps, seem not to share this chance character, since the development of each individual from the primary cell (the impregnated ovum) is directed toward a definite end from the beginning, toward the complete development of its species form. But according to our fundamental biogenetic law this determina-

tion is merely the abbreviated recapitulation, conditioned by heredity, of that long ancestral history (palingenesis). And even the subsequent course of the development of the individual till death depends upon accidental changes comprehended in the concept adaptation in its broader sense (cænogenesis). The entire infinite diversity of organic life on earth is conditioned by the fact that in the "struggle for existence" which is going on everywhere and at all times, thousands of circumstances cooperate by chance. There is no more conscious purpose (entelechy) or design in biologic evolution, as assumed by dualistic teleology, than there is in the national struggle for existence in the world war.

Chance in Anorgic Life.—The dominant force of chance is much more obvious and unmistakable in anorgic nature (in geology, geogeny, mineralogy, crystallography, hydrography, and meteorology) than in the organic life on our planet. Formerly all objects of anorgics used to be regarded as "lifeless" bodies. But the knowledge we have acquired of their nature and evolution in the last half century has led us to the recognition that inorganic nature also is endowed with real life in the broader sense.

Fifty years ago I made extensive researches

on the nature and origin of the organisms and their relation to inorganic substances, which I have embodied in my *General Morphology* (Vol. I, pp. 109-238). Since then many recent discoveries have demonstrated still more clearly the intimate relation, which I even at that time maintained existed, between the main groups of the natural bodies, the essential oneness of their substance and their evolution. On the one hand the monera, especially chromacea and bacteria, form a low group of "organisms without organs," whose highly simple morphological and physiological construction removes them far from the other organisms and brings them nearer to the inorganic substances. On the other hand, in the remarkable "fluid crystals" recently discovered by Lehmann, we have bodies which in many respects form a transition from inorganic matter to the simplest organisms. The "life" of the crystal, its growth, its regeneration, the regularity of its formation and structure, and especially its unconscious "sensation," are manifestations of life closely approximating those of the lower protists. But the fact that the crystal follows a regular course of development does not exclude it from the operation of blind chance. It, too, is subject to extensive modification by its relation to the surrounding world.

Particularly obvious and highly instructive is the influence of chance in geology and meteorology. The great changes in the surface of the earth which have gone on uninterruptedly for many millions of years and are still going on to-day are produced by the chance simultaneous action of a multiplicity of little processes of a purely mechanical nature due merely to physical and chemical causes. The same is true of meteorology, the science of the weather. Everyone knows that the weather may change from day to day, and that no weather prophet can foretell what will happen to-morrow. A single sunny day after long rainy weather, a single blast of wind in the mountains, the slightest diminution in the air pressure on the sea, suffices to change the weather for a great distance round and cause important atmospheric disturbances. And yet these events are occasioned in the first place chiefly by the play of incalculable chance, although each single factor is conditioned mechanically by physical laws.

Chance in Cosmic Life.—The universe as a whole with its numberless parts has often been compared to a colossal organism. This comparison is correct, both as regards the material unity of the whole cosmos, the energetic unity of all the

natural forces related to it, and the psychomatic unity of the all-embracing world-soul. But the comparison is false if taken in the sense of purposive organization of the whole world-structure, of a tendency toward a definite aim in the dualistic teleological sense. On the contrary, the marvelous progress of astronomy, especially astrophysics, spectral analysis and celestial photography, within the last thirty or forty years, has definitely established the following facts:

1. Though the many millions of stars irregularly scattered in the broad space of heaven (at quite unequal distances from each other and with different courses) all follow the great fundamental law of gravitation in their eternal motion, yet their unequal distribution and arrangement into smaller groups and larger systems shows not the slightest trace of purposiveness in the world structure.

2. The circular or elliptical or parabolic paths in which the heavenly bodies move round each other or around common central zones are not, as was previously assumed, constant and eternal, systematically ordered and arranged by an ingenious heavenly architect. They are changeable and determined by chance alterations of reciprocal relations.

3. The sudden appearance of new stars, celes-

tial bodies never before observed, which after a shorter or longer interval disappear again, can be explained only as the result of great world catastrophes caused by the collision of stars previously separated by great distances.

4. The numerous small bodies arising from such collisions through the shattering or pulverization of the larger ones enter upon new paths, and may by chance conglomeration form new nebulæ and again new rotating stars.

5. The changing phenomena which we observe in our sun, the protuberances, the corona, and so on, prove that the processes of inorganic life are active in this great central body also. And its phenomena are as dependent on a variety of chances as are those which occur on our own terrestrial globe; they are not guided by a preconceived purpose or aim. Thus it is the same in the vast region of cosmology as in the limited part of it, geology. The entire course of evolution of anorgic life is a purely mechanical process with no premeditated "wise plan" or "world purpose."

World War and Providence.—Despite these well-known facts, which every one who has his eyes open can see, many educated persons maintain that the destinies of nations and individuals

are not directed by mechanical laws and the constant play of chance, but are under the superior guidance of a God pursuing a conscious aim, who as Providence watches over the changing play of forces and directs them all towards a definite end. We know that this anthropistic conception, in which God is sometimes honored as a "universal Father" faithfully caring for his children, sometimes feared as an all-powerful Oriental monarch dispensing judgment, is still widely disseminated among the theologians and their next of kin, the dualistic philosophers. And it makes no difference in principle whether this "all-wise" and "all-knowing" scholastic God is worshiped in the coarse form of an idealized human being (as, for example, "Christ become a God") or in the finer form of an immaterial spirit who, as unseen Providence, intervenes in all men's destinies and guides them with a conscious purpose.

We do not deny the value of this faith in a "kind Providence" as a means to comfort suffering mortals and give them hope of a better future. But even in ordinary times of peace free-thinking and clear-seeing men have found it difficult to lend credence to these beautiful promises. All natural history and the whole course of civilization go to prove the opposite. We need but recall the infinite misery of human life in states of

slavery and barbarism, the unspeakable misery in hospitals and infirmaries, in prisons, in the slums of modern large cities; or the bitter suffering of millions of people in all ages when times were hard or epidemics or wars raged. And now this world war, with the staggering misery it has inflicted upon the masses and the individual, must surely destroy all faith in a "benign" Providence.

The same is true of the related belief in a "moral order of the universe," which endows this anthropistic ruler of the world with moral virtues.

Viewed in the light of reason, all these nebulous fancies of the dualistic faith are seen to be but the products of uncritical credulity or of deep-rooted mystical superstition. Even according to the old proverb, God helps only him who helps himself.

The Value of Human Life.—On few subjects do people differ so widely and hold such sharply contrasting views, both in theory and practice, as on the question of the value of human life, especially the life of each individual, each personality. Monistic science, based upon pure reason and the remarkable advances in biology in the last half century, teaches us that the life of man, as that of every other animal, is

a physical phenomenon, that his bodily, spiritual and intellectual properties are subject to the same general laws of nature as all other natural phenomena. Dualistic metaphysics and the greater part of theology in agreement with dualistic metaphysics, assert that human life is a supernatural manifestation not dependent on the ordinary laws of nature. This assertion is based especially on the property of the human soul, on the erroneously assumed immortality of the soul (or the "spirit") and on the moral requirements of practical reason. Added to this is the weight of sanctified tradition, of natural egoism, and numerous prejudices of all kinds.

We cannot enter here into a detailed discussion of the many contradictions involved in these assumptions. We must content ourselves with pointing out the obvious antagonism, still prevailing in our cultured twentieth century, between the exaggerated over-estimation of the individual, personal human life, on the one hand, and the exaggerated under-estimation of it on the other hand.

The Over-estimation of Human Life.—Since every human being is nearest to himself and governed by the instinct of self-preservation, like all other organisms, he seeks first of all to

preserve his personal life and avoid the dangers threatening it. Hence, from the very beginning a natural need for mutual aid has made itself felt in human society, and definite laws have arisen for the protection of the life of the individual and for his defense against the threatened attacks of others. With advancing civilization the code of laws based on this need has naturally gone on developing and has led to an increasingly higher estimation of the individual life.

In this process the subtle dialectics of the jurists have often come in conflict with the sound natural common sense that is based upon a knowledge of monistic anthropology. There is, for example, the very curious movement, finding so many adherents to-day, to abolish capital punishment. According to the view of many true philanthropists, which I share, capital punishment is not only a just retribution for murderers who have deprived others of their lives, but should be applied also to other incorrigible criminals. Life-long imprisonment, advocated in its stead, appears on closer, impartial consideration to be a much worse and crueler punishment.

Still odder—quite absurd, in fact—is the widespread opinion that it is the physician's duty to preserve a patient's life at any price. Of what good is it to the countless incurables whose exist-

ence is a constant torture to themselves and a heavy burden to their families? The insane, the cancerous, the elephantiacs who are longing for the end—what reasonable purpose is served by keeping them in their deplorable condition for years and years, or even maintaining special hospitals artificially to prolong their torments? What sense is there in keeping alive new-born babes that are monstrosities, with defects which absolutely preclude the possibility of a happy development and from the very outset condemn them to a miserable, pitiful, useless, burdensome existence? A small dose of morphine or potassium cyanide not only would liberate these pitiful creatures themselves, but would also free their parents from the prolonged onus of a worthless, painful existence.

I have already expressed (first in 1868, in the seventh chapter of *The Natural History of Creation,* and then in 1904, in the fifth chapter of *The Wonders of Life*) my personal convictions on the obvious benefits of the "Spartan selection," which more than two thousand years ago dedicated to death children who were born cripples. Kind physicians who grant the request of hopeless patients and relieve them of their intense suffering thereby fulfill the commandment of "love of one's neighbor." But according to our present illogical code of laws (which is full of outlived

medieval regulations) they are subject to punishment.

The Under-estimation of Human Life.—In sharp contrast to this absurd over-estimation of the personal life are the demands that society makes upon every individual in war for the common social interest. Never has this been brought so immediately to our consciousness as in the present gigantic world-conflict, which, in the number of human sacrifices and in moral and material losses, far surpasses all other wars ever waged. Every day we read of the heroic death of numbers of promising young men scarcely past the military age; of the loss of fine, strong men whose families at home are left fatherless. These losses are especially hard for us Germans, since the intellectual and educational level among us and our Austrian ally is much higher on an average than among our opponents, and therefore the personal life-value is also much higher. A single one of the finely educated German warriors, such as now fall by the thousands, alas! has a higher intellectual and moral life-value than hundreds of rude savages from Africa or elsewhere, whom England opposes to them.

Now, though we can only expect to carry this war to a successful issue for our country by mak-

ing these sacrifices with the unanimity and enthusiasm that we have shown, nevertheless we cannot help feeling daily the pain of it when we think that millions of valuable human lives must be sacrificed to a barbarous war of annihilation, which could have been avoided, had adequate reason, right politics and wise diplomacy prevailed on our side, and had international tolerance and a just appreciation of Germany's demands as regards her world position prevailed on the side of our opponents. It is sad for the friend of humanity, and especially for the pacifist, to see how deeply the estimation of the life of the individual has sunk in this war of the nations, and what severe wounds, the effects of which will last for a long time to come, the war is inflicting on human culture and civilization.

The Meaning of Human Life.—No less divergent than the conflicting views on the importance of human life are the views often accompanying them of the meaning of human life, its general and special significance. In answering this important question the monistic and dualistic philosophies part company at once, each following a different road. Our monistic or naturalistic conviction, firmly based upon the scientific knowledge of modern biology, especially anthropology,

applies the same principles to man in estimating the individual life as it does to the rest of the vertebrate animals, particularly the primates to whom man is most nearly related and from whom he is directly descended.

The definite solution of the cardinal question of the descent of man supplies a clear answer to these great questions as well as to that of immortality and eternity. The human race is a late product of the vertebrate branch, evolved in the last division of the Tertiary period from the family of the anthropoid apes, the highest primates. This is equally true of the organization of man's body and of the higher life of his soul or spirit. There is not a trace of evidence for the assumption of the immortality of the latter, of its continued eternal existence after death. Such an assumption is a sheer poetic fancy. Since there is no "other world," since a second, supernatural life is excluded, a man's task in "this world" can only be to make his earthly life as good and happy as possible. Highly developed civilized men do not find the solution of this task in the mere enjoyment of the senses, but in the consciousness of successful work, of fruitful participation in the progressive development of the whole human race. The true meaning of life consists in the

right application of practical reason to the conduct of life.

The dualistic or metaphysical philosophy naturally regards this question in an entirely different light. In conformity with the prevailing religious teachings it considers our earthly life a mere preliminary stage to a second higher life in an unknown "other world." It is quite conceivable that this supernatural, ideal life, decked with all the charms of an imaginative tale, should be esteemed more highly than our real life in "this world," where we have to struggle with all kinds of handicaps, like all the other animals. This is the reason for the contempt in which Christianity holds nature and for the foolish asceticism and self-torture practiced in the Christian convents and monasteries. For the monistically minded and naturalistically educated man of the future the meaning of life is to live consistently with reason and with nature.

Life and Death.—Our views of the phenomena and the nature of death have undergone a complete change in the course of the last half century. Modern physiology, in accord with the findings of physics and chemistry on the one hand, and of biogeny and crystallography on the other, has entirely removed the sharp line of de-

markation previously assumed to have existed between organisms and inorganic matter, between inanimate and animate nature. The growth and regeneration of mineral crystals is as much a "life process" as that of the simplest organisms. The lowest organic forms, the monera (chromacea and bacteria) are absolutely devoid of organization; their homogeneous, enucleate protoplasmic bodies are not purposive structures made up of different organs. They are "organisms without organs" in the truest sense. A crystal has the same morphological individuality as the simplest monera form. The fluid crystals, discovered by Lehmann, execute spontaneous movements like the monera. The simplest form of organic life is a purely physical process, the "catalysis of colloidal substance." When the growing crystals in a supersaturated (metastable) solution pass a certain point in their growth, they multiply by the deposition of new crystals, just as the homogeneous and structureless protoplasmic particles of the simplest monera multiply by simple division.

But when an organic individual breaks up in two by division, then its individuality is destroyed. In itself it is "dead," although its living substance continues to live in the parts it has produced. We cannot, therefore, regard the unicellu-

lar organisms (protists) as "immortal," since in the multicellular organisms also the protoplasm continues to live in the children, in the detached germ-cells, after the parent individuals have died.*

Voluntary Death and Self-Redemption. —This monstrous war, the "greatest crime in all

* In the fifth chapter of *The Wonders of Life* (1904) I have fully refuted the notions, wholly erroneous and logically untenable, which August Weismann, who has made notable contributions to zoology, successfully introduced into biology through his *Ueber die Dauer des Lebens* (1882) and *Leben und Tod* (1884). In the same chapter there is an exhaustive inquiry into the death of the individual, the deterioration of the protoplasm, necrobiosis, and all the important questions of death associated therewith; and in Chapters II and VIII a discussion, especially, of the important analogy between cells and crystals. An unbiased examination of these facts and the comparative study of death among the higher and lower organisms have essentially clarified our modern conception of the nature, the conditions, and the consequences of individual death. In man, as in most of the higher vertebrates, the life of the entire multicellular organism ceases instantaneously the moment the orderly cooperation of all organs in his complicated machinery are disturbed by the destruction of the central organ. In lower animals and plants, on the contrary, the individual may continue to live even after the separation of many of its parts. In fact, even these parts are often able to continue an independent existence, and may by regeneration become a complete independent being again. So we may distinguish between a total and a partial death of an organism (Cf. Chaps. II and VII of *Wonders of Life*).

history," with its unexampled tragedies and disasters, has inspired thousands of people, whom it severely affects with a desire to put a quick end to their suffering by voluntary death. Judged from the rational point of our monism this desire seems perfectly justified and morally unobjectionable. One need but think of the excruciating agony of the wounded soldiers left lying in the turmoil of the international slaughter; one need but think of our noble, finely educated German volunteers tortured and maimed in unhuman fashion by the "hyenas" of the battlefield, the barbarian Indians and the cruel Senegal negroes. One need but think of the unspeakable grief of mothers who have lost their only sons, of wives who have lost their beloved husbands, of children who have lost their devoted fathers. Then there are the numerous poor without means, whose entire support has been taken from them by the ruthless enemy and who are exposed to certain death from starvation. There are the wretched cripples with eyesight, arms or legs gone, condemned to long years of misery and pain. What man with pity in his heart can blame these poor people if they try to put a quick, painless end to their hopeless agonized existence with a pistol shot or a morphine powder?

To call this "self-redemption" (autolysis) self-

murder and condemn it morally is perfectly absurd, as I have pointed out even before we had this experience of the war, in the fifth chapter of *The Wonders of Life*. The traditional condemnation of voluntary death is all the more preposterous when we consider that to give up one's life in the interest of others or of society is glorified as an act of heroism. We then call it sacrifice for one's fellow-men or for the state. In this, as in many other cases, the same course of action is deemed highly moral when practiced for the state, and condemned as highly immoral when done for the individual. And yet the altruistic values of the state are indissolubly connected with the egoistic interests of each of its citizens.

Spontaneous Generation (Archigony).— The progress of modern physiology to which I have referred not only has removed the sharp division between anorgic and organic nature firmly believed in before, but also has solved the difficult problem of how organic life originated on our planet. We now regard the life of all organisms, hence also that of man, as a purely physicochemical process, the essential action of which is the catalysis of a colloidal substance, protoplasm. This true "vital substance," a nitrogenous car-

bon compound of the group of albumins (or, according to others, a mixture of different albumins), constitutes the natural basis of all living substance. It is this vital substance that alone produces the manifold forms of energy and of the psychom which we regard as the most characteristic functions of organic life—from the simplest monera without a nucleus up to the unicellular protists; and from the lower invertebrate animals up to the vertebrates with man at the top.

I have given an account of the manner in which protoplasm originated from inorganic compounds in my hypothesis of archigony, that is, spontaneous generation in a quite definite sense, in the fourteenth chapter of *The Riddle of the Universe,* and more exhaustively in the second, sixth and fifteenth chapters of *The Wonders of Life,* refuting also the old erroneous doctrine of a special "vital force" acting teleologically (*vis vitalis*).

Though more than sixty years ago the old vitalism was completely overthrown by the progress of physical and chemical physiology, yet this mystical palavitalism has recently been revived in the new form of neovitalism. What distinguishes this neovitalism is its complete ignoring of the modern results of evolution and its use of the unintelligible phrases of sophistical dialectics.

The dualistic and teleological view of nature that crops up in it was thoroughly refuted long ago by our monistic and mechanical natural philosophy. We find that the eternal and inviolable laws of nature, and they alone, rule throughout all phenomena, in biology as well as in anorgics (or abiotics). This must be specially emphasized because the natural unity of cosmic evolution is negated by the misleading doctrine of vitalism.

THE FEAR OF DEATH.—The question that presents itself daily to millions of soldiers in the wholesale murder of the present world war is how they are to look upon death and what will follow after death. The answer to this question will vary greatly according to the personal estimate of the importance of life and the firmly rooted traditional conceptions.

The well-educated man of the present day familiar with the teachings of biology, one, especially, convinced of the truth of the theory of evolution, regards death with rational resignation, as a natural necessity, which must come sooner or later in any circumstances. If he has made the principles of monistic philosophy his own, not only in theory, but also in practical conduct of life, he is as firmly convinced of the limited span of his personal existence as of the

transitory state of all individual things. He will try, therefore, by fruitful activities and the lively enjoyment of nature, to make his life as good and as happy as possible, and leave the decision of his fate to blind chance, which rules the universe in the absence of a wise Providence.

If his ethical development is high enough for him to have achieved the proper balance between egoism and altruism, he will also be mindful of his social duty to the state and will gladly offer up his life for the preservation of the fatherland. In this war of the nations we witness every day with what enthusiasm thousands of German warriors go into battle and sacrifice even their family happiness to the higher interests of their country. The bravery of fighting heroes who are without fear of death has justly been regarded as a lofty virtue for centuries. Such an attitude to death is what we should logically expect of the great majority of athanatists, who believe in the personal immortality of their souls and usually expect a better life after death. Nevertheless we know this is not so. On the contrary, in the case of most men the natural egoistic instinct of self-preservation is paramount. In many instances, too, the fear of death is nourished by numerous superstitions and sanctified traditions, as, for ex-

ample, the fear of purgatory in the Catholic church, or the horror of an imaginary inferno or hell, which plays a great rôle in the poetry of most nations.

In classic Greek sculpture death was represented as a beautiful youth, the brother of sleep. And so should the modern man of culture look upon death. After a life spent in satisfying activity and the performance of duty, he should welcome gentle death as a happy natural conclusion and banish all foolish fear of it. As at the end of a glorious day spent tramping in the country, after the keen enjoyment of lovely nature, and in the sense of past exertions, we look forward with pleasure to a refreshing night of rest; so, in the contemplation of duty well fulfilled and in the interesting remembrance of changing fortunes, we should greet death the inevitable as an "eternal sleep."

CHAPTER II

THE WORLD WAR AND RELIGION

Value of Religion—Theoretical and Practical Religion: (World-conception and Conduct of Life—Cosmology and Ethics)—Monistic Religion—Dualistic Religion—The Pantheistic God—The World War and Science—The World War and Dogma—Religion and Creed—The World War and Christianity—The World War and Christian Morality—German Christianity (Reformation)—English Christianity (Panbritism)—Columbanian Christianity (Dollarism)—The Holy War—The Ethics of Monism.

Value of Religion.—For more than a year now prominence has frequently been given to what is said to be an important manifestation of the war, namely, a tendency to religious absorption and reflection. We are told especially that the effect of the terrible events of the monstrous international carnage has been to make men consciously draw into themselves and search their souls, to divert them from the lower life of ordinary every-day existence to the higher spiritual life of religion.

As a matter of fact we do witness a tendency

among many people in civil life to resume the external religious exercises formerly neglected. The oppressed human spirit, threatened with a thousand dangers, daily suffering personal and material losses from the bloody upheaval, seeks protection and help in the "higher powers," whether these are conceived as a personal God or as Almighty Destiny. Moreover, this great "awakening of the religious instinct" manifests itself no less among the fighting hosts than among their families left at home. The protection of the Almighty is invoked in solemn religious services in the field and in sermons in the church, in public prayers and sacramental rites. The generals and princes leading their armies to bloody battle implore the aid of God, confident that victory must be awarded to their "good cause." And it often happens that two hostile armies trying to destroy each other call upon the same God, each claiming his impartial justice.

We shall readily understand this great intensification of the religious feeling and the revival of divine worship which usually accompanies it if we go back to the various original sources of religion. The fear of threatening dangers, the obscure terror of unknown natural forces, the grief over painful losses, the need of higher protection, make men seek refuge in the Almighty

God who is the personal head of most religions. Owing, however, to the diversity in the conceptions of the highest objects of men's thoughts and feelings, differing with the different peoples, races, nations and classes, it is necessary to inquire more closely into the true content and value of religion. In this inquiry we must distinguish between the theoretical and practical significance of religion. But we need not here enter into the broad and interesting field of the history of comparative religion, nor need we examine in detail the main problems of the philosophy of religion. It is enough for us clearly to comprehend the difference between the two principal currents in the world of religious ideas, the monistic and the dualistic.

Theoretical and Practical Religion (World-conception and conduct of life—Cosmology and ethics).—To the thinking man every real religion, whether it be of the monistic or dualistic tendency, has a twofold significance. First, it serves, theoretically, as a firm basis for the formation of a rational view of the world. It determines the limits and the content of a comprehensive cosmology. Second, on its practical side, it creates the standards for the satisfactory conduct of life. As ethics or morality—or as

JENA, GERMANY

The home of Haeckel and of the Phyletic Museum which he founded

"pragmatism"—it supplies definite rules for the business of life. Both fields of religion should really always remain in harmony, interacting and mutually determining each other. However, we know that very often this is not the case. We frequently find a stern religious conception of the world coupled with extremely immoral living. And inversely a free cosmology detached from all religious dogmas is often combined with thoroughly moral and upright living.

This contradiction between theory and practice is as true of philosophy as it is of religion. In fact, originally these two fields of the higher intellectual life were closely united. Later they grew apart, and the main province of philosophy came to be rather the acquisition of a clear theoretical view of the world, while religion furnished a guide for active moral conduct in practical life. In the Christian religion, for example, the creation dogmas as taken from the Mosaic teachings of the Old Testament are utterly at variance with the clear results of modern science. On the other hand, the social precepts of Christian morality derived from the ethical teachings of the New Testament are for the most part extremely valuable for the purified ethics of modern cultural life. Hence in a comparative consideration of the religions of the various nations and

various stages of civilization we must always distinguish between the theoretical value of their world philosophies and their practical value in the shaping of a moral life. We shall here dwell first on the former aspect, clearly opposing to each other the two main views of the world, the monistic and the dualistic.

Monistic Religion.—The essential, fundamental principle of modern monism, which I presented fifty years ago in my *General Morphology* and elaborated in several subsequent works, is the assumption that there is one natural basic principle underlying all the knowable phenomena. As early as the sixth century before Christ the old Greek natural philosophers affirmed positively a unified common cause for all the manifold phenomena of existence. Of the far-seeing Ionic physiologists, Thales of Miletus assumed Water to be the common origin of all things; Anaximander of Miletus and his pupil Anaximenes, Boundless Space (*apeiron*) or the Air (corresponding to a cosmic ether with periodic world formation and world destruction); Heraclitus of Ephesus, "Fire-Ether" with all things in a constant state of change. This "hylozoistic monism" was superseded in the fifth and fourth centuries before Christ by the opposing

dualistic ideal philosophy which Socrates and his pupil Plato introduced. Since their teachings of two separate distinct worlds, a material world of body, and an ideal world of spirit, harmonized with the teachings of Christianity that spread soon afterwards, they remained supreme throughout the Middle Ages.

It was not before the sixteenth century of our era, in the period of the Reformation and the Renaissance, that monism gained a new impetus through the great Dominican monk Giordano Bruno, and in the seventeenth century through Spinoza. Their doctrines of the unity of God and Nature (*Deus sive Natura*) prepared the ground for the later "Philosophy of Identity," which in religion became pantheism. In recent times various forms of monism have developed, some with a more materialistic tinge, others with a tendency more spiritualistic, energetic or psychomatic. All forms of monistic religion share in common the fundamental idea that nature and God together constitute one unified world-principle. Goethe has given the most beautiful expression to these pantheistic conceptions in his incomparable poems ("Faust," "Prometheus," "God and the World," etc.). In so far as it excludes a personal God distinct from the world

this monistic pantheism is also Atheism. In some countries, however, such a "religion without God" arose independently many centuries ago, especially in Indian Buddhism and the Chinese religion of Confucius, the most widely disseminated religions of Asia (500 B. C.).

Dualistic Religion.—While our monistic religion asserts the unity of substance in all things, all dualistic religions assume two different fundamental principles in the world of phenomena and existence. God as the immaterial invisible "Spirit" lives outside the world cognizable by the senses, as its "Creator and Sustainer." The higher and still prevalent forms of this theism, especially the three great Mediterranean religions, Mosaism, Christianity and Islam, regard this personal God as an independent being (*On*). They ascribe to him the qualities of an all-powerful Oriental monarch. When this scholastic God (*Ontheos*) rules and preserves the world by himself, then the religion assumes the form of pure monotheism. But when the world is ruled by two different "supreme beings" in conflict with each other, a good and an evil principle, God and the Devil, amphitheism takes the place of monotheism. To these two personal Gods there is added in triplotheism still a third person, as in the old

Indian, Chaldean and Christian trinitarian doctrine.

In the first two synoptic tables of my last work, *God-Nature,* (pp. 64, 65) I have given a short account of these "principal forms of ontheism." Most of the dualistic religions share in common the idea of the anthropistic character of their God. The personal God thinks and speaks, sees and acts like a man, only in a more perfect degree. He is generally conceived as an invisible "Spirit." The obscure notions of such "spirits" were originally derived from the analogy of the human soul with a breath of air or with the wind, and this airy or gaseous consistency was then transferred to the invisible "spirit of God." Thus we have the paradoxical conception of a "gaseous vertebrate." I discussed a little more at length the significance of this much misunderstood conception in my *God-Nature* (p. 40); and I also mentioned the numerous contradictions in which the God idea necessarily becomes involved in the light of anorgics, the science of inorganic nature, on the one hand, and biology, the science of organic nature, on the other. That is why recently the notion of a personal God has entirely disappeared from anorgics, while it still persists, in defiance of all pure reason, in the vitalistic and teleological school of biology.

The Pantheistic God and the Scholastic God (*Pantheos and Ontheos*).—In view of the uncertainty and obscurity which still prevail in many quarters as to the nature of the different religious conceptions, it is important to come to a perfectly clear idea of the essential distinctions between the two main currents of religion, pantheism and ontheism. The common foundation of all purified religions, it may be assumed, is the conception of a last and supreme origin of all phenomena, of a first "cosmic cause." This first cause may be admired and revered as God (*Theos*) in both religious groups. But despite the uniform trend of both, there still remains an essential difference between them, which ultimately is this, that the pantheistic God has his seat in the material world itself as an unconscious "original force"; while the scholastic God (*Ontheos*) possesses anthropomorphic consciousness, and as an "Almighty" subject creates and rules from the outside the objects of the real world. The pantheistic God (*Deus intramundanus*), as cosmic "origin of the world," is the all-comprehending universal God and rules the universe in accordance with the immutable laws of nature unconsciously, without a "moral order of the universe." The scholastic God, on the other hand (*Deus extramundanus*), as anthro-

pistic "origin of the world," is an individual personal God. He creates and rules the universe consciously, and with full freedom decrees the laws of the "moral order of the universe," in accordance with which he disposes all things purposively "in wisdom and understanding." The God of pantheism is the perpetual law of nature itself and cannot change nature arbitrarily; hence he cannot perform miracles. The scholastic God of ontheism, on the other hand, possesses full personal freedom; he therefore can always change the laws he himself has made and perform all conceivable miracles.

The more we reflect on this antithesis between pantheism and ontheism, the more convinced we are that the scholastic God of the latter is nothing but an idealized human being. All his qualities are anthropomorphic, conceived in human likeness. Hence the whole theistic order of the world established thereon is anthropocentric. Man as the image of God is the highest aim and the centre of the universe around which everything turns. This is the origin also of the idealistic deification of man or "anthropolatry" which so flatters the vanity of man—a lately developed higher mammal. We combine these three concepts, the anthropomorphic, anthropocentric and anthropolatric, in the one concept of anthropism.

Grave errors, it will appear, have sprung from this self-deification of man.

The World War and Science.—The extraordinary significance of science as the supreme result of all the cultural work of humanity has never been so clearly brought to our consciousness as in the present stupendous war. On the practical side this will be readily seen from a comparison of the conditions and requirements of military science to-day with those of former wars. The astonishing advances made in the last half century in all the positive sciences based on experience, especially in physics, chemistry, geography and ethnography, have not only enlarged to an extraordinary degree our theoretic knowledge of the earth and its inhabitants, but have led to such perfection in the technical sciences that entirely new instruments of warfare have been created. It is sufficient here to mention briefly the marvelous development of our means of communication—railroads and steamships, electrical tramways and airships, telegraph and telephone, weapons of attack and weapons of defense of the most refined nature.

All these inventions and products of the modern technical sciences are based upon the theoretical progress of natural science, which in the

course of the last eighty, especially the last forty, years has reached a point of development never dreamed of before. We owe these advances to the growing acuteness of our sense organs, the primary sources of knowledge, and secondly to the perfection of the technical instruments (microscope, telescope, spectroscope, etc.), and above all to the higher development of the phronema, the organ of thought in our cerebrum. Never have we been so conscious as to-day of the incomparable value of human reason, that organ of causality or of the perception of causes which elevates the modern man of culture so far above the rude savage and above the ancestral series of primates from which he has sprung. But in the measure that reason and science, "man's highest potency," have risen and lifted us up to a higher view of the world, the value has sunk of those old "doctrines of faith" which in former periods of civilization constituted the foundation of world-views.

The World War and Dogma.—Before touching briefly upon the old conflict between science and religion, between reason and imagination, let me refer to my general remarks in *God-Nature* (1914) on the monistic and dualistic theory of knowledge which I make there prefa-

tory to a discussion of the relation between religion and philosophy. The knowledge of truth can be acquired only by objective and critical science, by natural experience, observation and experiment, by unbiased comparison and causal analysis of phenomena; for all of which the sole instrument is pure reason, the intellect.

On the other hand the paths of so-called revelation are misleading and hostile to truth, whether revelation be regarded in the sense of the churchly dogma as divine, supernatural "revelation" (*apocalypsis*), or in the sense of the dualistic philosophy, as "higher intuition" or innate knowledge independent of experience. This higher revelation or inspiration is a sheer figment of the imagination. It usually rests its claims upon men's spiritual requirements. But this has nothing to do with knowledge and truth. It leads rather through the tortuous paths of mysticism and theosophy to those fantastic notions which had such a manifold development in the variegated mythology of antiquity as well as in the miracle stories of Christianity and other religious poetry.

All these transcendental and supernatural dogmas must, however, be clearly distinguished from scientific hypothesis. The latter are rational assumptions seeking to fill out the gaps of our lim-

ited knowledge in a natural way, by the discovery of the true causes. In the presence of the prodigious events which the world war brings directly before our eyes the clear-thinking rational man will try to attain an impartial knowledge of the true natural causes of all events. But the power of tradition and the sanctified churchly faith is so great that many still believe in miracles or supernatural causes. This is due in large measure to force of habit, the cravings of the human spirit and the authority of the schools.

Religion and Creed.—Since Turkey has taken a definite position in the world war and joined Germany and Austria as a welcome member of the central powers, the relation of religion to the world war has undergone an important change. In the auspicious "new triple alliance" there are now fighting side by side as faithful comrades the Germans, who are predominantly Protestant, the Austrians who are predominantly Catholic, and the Turks who are for the most part Mohammedan. In addition there are thousands of believing Jews and a very large number of monistic dissenters. These last, who have given up all superstition and base their view of the world solely upon the conclusions of reason and the results of science, belong for the most part to the

higher, better educated circles of society in all the three countries of the new triple alliance. Their knowledge and influence are much greater than may at first appear. From practical considerations many free-thinking dissenters outwardly still observe the traditional customs of their churches, although inwardly they lost faith in them long ago.

It is noteworthy, though, and highly gratifying from the point of view of cultural progress, that in the mixed camps of the world war the religious differences of the soldiers scarcely affect their faithful comradeship. This is an encouraging step in the direction of that purified religion glorified in Lessing's *Nathan the Wise* as the foundation of true morality. The conviction is gaining ground steadily that the value of true religion in practical life and morals is not dependent on the special theoretic dogmas of each separate confession. For the rest, the science of comparative religion teaches us that the larger part of these highly esteemed "sacred" dogmas are nothing but products of the poetic imagination—sometimes old, old superstitions, sometimes divers doctrines of dualistic speculation. The different opinions and judgments exchanged daily in the prodigious events of the world war among the soldiers of different creeds living to-

gether in the trenches and fighting side by side contribute greatly to a desirable elucidation of the most important questions of life and also to a tolerant attitude toward those professing another religion. The promotion of humanity as the common aim to be striven for by all advances more and more to the foreground, the promotion of that higher culture the religion of which is monism based upon reason and science.

The World War and Christianity.—The vast majority of the civilized nations now trying to destroy each other in the war profess faith in the Christian religion. Historically the great practical value of Christianity is beyond question, its real value for a higher ethics and a nobler conduct of life. But it is otherwise with Christianity as a theory, as a philosophy that can lay claim to scientific validity. In the seventeenth chapter of *The Riddle of the Universe* I have set forth clearly the important relations between science and Christianity, the irreconcilable antagonism between monistic scientific experience and dualistic Christian revelation. It will suffice here to call attention to the fact that all attempts at an artificial reconciliation between the two have completely failed.

The dogmatic articles of the Apostles' Creed

containing a summary of the most important fundamental ideas of the Catholic conception of the world are thoroughly opposed to the established empirical principles of modern science. The same is true of the three articles of faith of the German Protestant catechism, which are still taught today in most of the schools in the form in which Luther presented them, as the most important religious foundation of education. The first article affirms belief in the supernatural "creation of the heaven and the earth" by Almighty God the Father; the second article affirms belief in his "only begotten son, Jesus Christ," in the parthenogenesis of Christ from the Virgin Mary, in his descent to hell and his ascension; the third, in the mystical "Holy Ghost," the resurrection of the flesh and the life eternal. Regarded in their true character as religious poetical inventions, these articles of faith may claim the same poetic, esthetic and ethical value as similar fantastic creations of other religions. But when we ascribe to them the authoritative importance of irrefutable truths and make belief in them the basis of the entire education of our youth, then we cannot lay too much stress upon the fact that they are false from beginning to end, and that they contradict the sure achievements of reason, and of science acquired through reason. This is espe-

cially true of the belief in the impossible "resurrection of the flesh and an eternal life," a mystical fiction positively refuted by the empirical solution of the anthropological "cardinal question."

THE WORLD WAR AND CHRISTIAN MORALITY. —The most important principle of Christianity (in the best sense) is universal love for one's fellows. All men, no matter to what nation or class they belong, are "children of God," all are equally images of the "almighty Creator of the heaven and the earth." Genuine Christianity preaches pure altruism and rejects one-sided egotism. "Love thy neighbor as thyself." Rather suffer wrong than commit wrong. "If any man will take away thy coat, let him have thy cloak also." "Love your enemies, bless them that curse you."

This principle of brotherly love is of course bound up with the principle of pacifism which Christian ethics teaches. Not only is war in general rejected, but all the individual deeds of brute force, all the savage atrocities daily enacted by the thousands in this war. If, from the point of view of pure Christianity, no war is permissible, not even a war of defense against unmerited attack, then surely this, the greatest of all wars, is not permissible. This war, which affects all the

civilized nations of the globe, qualitatively as well as quantitatively, surpasses everything that suffering mankind has had to endure before, everything, in fact, that it thought it could endure. Yet we are to believe in the goodness of a "loving God," in the wisdom of the ways of "Providence," in the justice of his "moral order of the universe."

The fact is that the present world war spells the total collapse of Christian morality, just as the undreamed-of progress of the natural sciences within the last sixty or eighty years was bound to lead to the total bankruptcy of the Christian theoretic doctrines. Upon the ruins and ashes of the Christian "world religion" and its superstition the new rational religion of our monism must rise triumphant. It alone rests upon the knowledge of the real laws of nature; it alone raises the Golden Rule to the highest form of our life by establishing a proper balance between egoism and altruism.

German Christianity (The Reformation).—Germany stands foremost among the civilized nations in its contribution to a rational development of Christianity. German theology, through the Reformation, more than four hundred years ago, effected an advance in higher intellectual

culture so important that the beginning of the sixteenth century marks the beginning of a new era in the history of civilization. It is true that a new intellectual life had already begun in the fifteenth century—the "renaissance" of art, the discovery of America (1492), the invention of printing (1450), and also the re-birth of independent natural research. All these paved the way for the dissipation of the dark night of the Middle Ages. Yet it was an epoch-making event when Martin Luther, on the 31st day of October, 1517, nailed his ninety-five theses to the door of the castle church of Wittenberg, and so began the decisive war against papism which ushered in the new birth of hitherto fettered reason.

Still more significant for progress towards a correct view of the world was the achievement of another German theologian, Nicholas Copernicus, canon of Frauenburg, whose book, published twenty-six years later, overthrew the Ptolemaic system of astronomy, and in its place established the heliocentric system. The prevailing geocentric view of the world was shattered, and the earth lost its dominating position as the centre of the universe; along with it Christian mythology, up to that time embracing but the short span of 1,543 years, also dropped from its central position.

Three hundred years later German theology again exercised a most important influence upon the neo-formation of philosophy. Its prominent representatives transformed the traditional mystic ontheism into a rational pantheism founded upon science. Schleiermacher in his *Addresses on Religion,* Ludwig Feuerbach in his *Essence of Christianity,** David Strauss in his *Life of Jesus,** and his more recent work, *The Old Faith and the New,* as well as many other free-thinking German theologians, prepared the ground upon which in the last third of the nineteenth century our monism, supported by the wonderful advances in modern natural science, could lay the firm foundation of a new natural monistic religion. The pseudo-Christianity of the nineteenth century was thus reformed. The importance of this reform I have set forth in the seventeenth chapter of *The Riddle of the Universe,* in which there is also a critical examination of the historical development of Christianity.

English Christianity (Panbritism).—The most important aim which England professes to pursue . . . is the spread of higher culture by educating the world to the Christian religion. No other civilized nation displays so much zeal, so

* English translation by George Eliot.

great an activity in this direction as Great Britain. English missionaries penetrate to all countries; English Bible societies distribute millions of copies of the Scriptures; the English Salvation Army spreads the Gospels among the people. In many hotels in India and Egypt, as well as in Switzerland and other countries favored by English tourists, the traveler finds copies of the New Testament in the reading rooms and bedrooms. Zealous preachers indefatigably inculcate the teachings of the Christian religion in innumerable churches and chapels of the English-speaking world. In many English homes, especially of the higher classes, the external cult of Christian ceremonials, like saying grace at meals, is regarded as an essential part of the finer accomplishments.

No doubt a large part of this Britannic Christianity is sincere and actually does contribute to the refinement of life and customs. But by far the larger part of it is perfunctory. The English go through their religious exercises without warm inward participation, as a matter of habit, or for purposes quite unspiritual and worldly. Indeed, a great deal of English religious practice is downright, deliberate hypocrisy.

Columbanian Christianity (Dollarism).—We cannot refer to this unpleasant subject . . .

without noting the same kind of hypocrisy in North America. Unfortunately, the United States plays so fateful a rôle in this Great War that that so-called neutral country has placed our principal enemy, Great Britain, under great obligations to her. To understand this deplorable fact we must bear in mind the historical development of the United States, which freed itself from the yoke of the English mother country only one hundred and forty years ago. Owing to the fact that since that time a great many immigrants from Europe and other parts of the world have settled in the United States and intermingled freely, that vast territory has not the unified, national character which more or less marks most of the states of the Old World. It is significant that there is no generally recognized designation for all the inhabitants of the United States, although politically they form a unit. "Yankee" is usually applied to the New Englander. An appropriate name for the people of the United States would be Columbanians, after the discoverer of the New World, Christopher Columbus.

Adopting this name, we will call the prevailing religion of the country Columbanian. It must be understood, however, that the Columbanian form of religion has developed independently of

the state, in more than a hundred and fifty different sects. There is no Columbanian state church possessing the "sole means of dispensing grace." The desirable separation of state and church, the first prerequisite of free intellectual development, has been carried out practically in Columbania, as well as in Holland and recently in France, with no injurious effects to the religious needs of the nation. Despite their strong business sense the Columbanians hold church religion in high esteem, at least insofar as the external forms of "divine service" are concerned. But that does not prevent the Yankees from paying scant heed to Christian morality. . . .

THE HOLY WAR.—When the sultan in Constantinople as the spiritual head of the whole of Islam had declared the entrance of the Mohammedan world into the Great War many people feared that the "Holy War" thereby proclaimed would again degenerate into a fanatic "religious war," one of the worst and at the same time most foolish forms of warfare. Some even expressed fear that the Turks, and the Mohammedans of Asia and Africa allied with them, would threaten the whole Christian civilization, and set the crescent in place of the cross. These fears have not been fulfilled, nor could they have been fulfilled,

as everyone recognizes who knows the different degrees of progress attained in different parts of the world during the nineteenth century, particularly the latter half of it. The advanced state of education in all strata of society, the exchange of spiritual and material treasures by means of international communication, and the simultaneously increasing tolerance of the various creeds toward each other have effected a fundamental change in men's views as to the importance of the creeds.

In an excellent book, Dr. Galli, former German General Consul in Algiers and Smyrna, a man thoroughly familiar with the Orient, has given us a clear idea of the meaning of the Mohammedan Holy War, the *"Jehad,"* and its significance in the world war, with special reference to German interests. The present holy war is not like the holy wars of the past, a religious strife between the creeds of the three great Mediterranean religions, the Jewish, Christian and the Mohammedan. . . .

The Ethics of Monism.—The new purified religion of the twentieth century, which it is to be hoped will rise up out of the huge mountain of ashes of the present world war—a phœnix spreading its blessings over the whole of human-

ity—must inevitably adhere to modern monism as its impregnable foundation. For only the naturalistic or pantheistic monism can establish a satisfactory union between religion and science, which, as I stated in my Altenburg lecture twenty-three years ago, is the most desirable goal of civilization.

On the one hand we must, in theory, hold fast to the principle that only rational science should form the basis upon which to rest our monistic view of the world. Since the vast progress of the natural sciences in the last half century resulting from the discovery of the theory of evolution has also brought the more strictly human sciences under the domination of the natural laws, we can henceforth regard as authoritative none but these natural laws, with the definitively established doctrine of the descent of man at their head. We can accept as real truth none but the facts of experience securely established by observation with our senses and by rational combinations in our organ of thought, the phronema. But all so-called "revelations," all fancy products of "intuition" or "inspiration," must be strictly excluded.

On the other hand, in practice, our monistic religion will have to adhere to those rational principles of purified morality which Christ ex-

pressed in the simple sentence: "Love thy neighbor as thyself." Christ, however, was not the first to raise this Golden Rule, our highest ethical law, to the guiding principle of thought and action. Six hundred years before the same principle was proclaimed by various sages and religious founders of antiquity, as the Greek natural philosophers, Thales, Pittacus and Aristippus, and the great founder of the Chinese religion, Confucius.

The weakness of most Christian teachings, however, was that it made altruism the sole principle of human conduct and sought to eliminate natural self-love, or egoism. But in our conviction, resting on nature, these two rival instincts in men possess equal rights. There is a necessary interaction, a natural equivalence between egoism and altruism. We all have duties of individual self-preservation which are as legitimate as our social duties. It will ever remain the most important task of our monistic ethics to restore a sound harmony between egoism and altruism in the practical conduct of life. In *The Wonders of Life,* Chapters XVII to XIX, I have set forth in more detail the method by which the precepts or "imperatives" of our monistic morality can be developed on the basis of the theory of evolution. I would call special attention to the works

there referred to of Barthalomäus Carneri, Friedrich Jodl and Ludwig Feuerbach. Among the most important of the precepts is Wilhelm Ostwald's "energetic imperative": "Waste no energy; utilize it."

CHAPTER III

THE WORLD WAR AND THE CARDINAL PROBLEM

The Value of the Cardinal Problem—Evidences for Man's Descent from the Primates—Evidences from Anatomy—Evidences from Histology—Evidences from Physiology—Evidences from Embryology—Evidences from Paleontology—The Anthropological Foundation—The Zoological Substructure—Unity of the Vertebrates—The Vertebrate Classes—The History of the Vertebrates—The Race History of the Primates—The Invertebrate Ancestors of Man—The Savage and the Civilized Man—Races in the World War.

THE VALUE OF THE CARDINAL PROBLEM.—Of the multitude of questions that present themselves to the thinking mind, the most momentous by far is the question of the nature of man, his origin and his relations to the rest of the world. That is why Thomas Huxley, on the publication of his famous three lectures, *Man's Place in Nature,* in 1863, justly called it the "question of questions." It is forty years now since the problem has been definitely solved by the production of positive proof that man is descended from the primates. Many prominent writers, it is true, especially theologians and dualistic metaphysi-

cians, still maintain that the attempt to prove the doctrine has failed, or it is no more than an "uncertain hypothesis." But the unbiased thinker who is familiar with the empirical evidences in support of the theory must be convinced that the descent of man from a series of extinct mammals is an indubitable historical fact.

In my *Anthropogeny,* in 1874, I have critically collated all the "documents" bearing on this question, accompanying them with numerous illustrations. In the first volume I dealt at length with the embryonic history of man, in the second with the corresponding tribal history. The lecture on *The Problem of Man and the Primates* (1907) gives a succinct epitome of all the evidences on the subject. A more thorough development of the "Critical Studies of Phyletic Anthropology" is presented in the jubilee writing, *Our Ancestral Series,* published July 30, 1908, on the handing over of my Phyletic Museum * to the University of Jena.

The fundamental importance which I ascribe to this human progonotaxis is based upon the conviction that the descent of man from the primates really contains the key to the solution of all the world riddles. For what is true of the organization of man's body, that it can be

* Established at Jena as a Haeckel Memorial.

derived only from the nearest related anthropoid apes, is true also of the "human mind," of his entire soul activity as the physiological function of that most highly developed organ of thought, the phronema in the cerebrum. No one familiar with the large field of the biological science in question, and able to make a comparative objective estimate of the empirical data it furnishes, can fail to recognize that the happy solution of the cardinal problem really contains the definitive answer to all the highest questions of the contemplative human intellect.

Evidences for Man's Descent from the Primates.—In view of this universal importance of the cardinal problem, unsurpassed in importance by any other problem in science, it is imperative to subject all the empirical records bearing thereon to a strict test from the standpoint of their evidential validity. In so doing, we must make use of all the vast resources which the brilliant advances in our knowledge of nature during the last century have placed in our hands. We shall therefore first have to examine singly the special results of *exact* natural research and *historical* investigation, and then see what general results they yield in the aggregate.

The inductive knowledge thus attained, cor-

rectly estimated and applied, will lead to the most important deductive conclusions. It must always be borne in mind, however, that phylogeny, the tribal history of organisms, like her inorganic sister, geology, does not belong to the exact, but to the historical natural sciences. Consequently future research can do much to correct and supplement our phylogeny in detail. But the great general results—and it is they that are of prime importance in this question—will on the whole always remain the same. After testing the sundry biological records we will consider especially the invertebrate group, for which comparative zoology furnishes a secure basis.

Evidences from Anatomy.—When almost two hundred years ago, Carl von Linné, the great Swedish scientist, completed his fundamental work, *Systema Naturæ,* he placed at the top of the animal kingdom the class Mammalia, and called the first order "Anthropomorpha, Man-shaped Animals." Three of the four genera into which he subdivided this order, to which he later gave the name of primates, were man, ape, and half-ape (*homo, simia, and lemur*). The anatomical affiliations between these three genera, which were later raised to the rank of families or orders, have mostly remained the same, though

they have undergone various interpretations in detail. The following are the most important conclusions reached by zoologic investigations.

I. The primates constitute a distinct legion of mammals originating from a common root and distinguished from the other mammals by special anatomical structures, though sharing all their essential features.

II. The lowest of the three orders connecting immediately with the oldest insect eaters (hedgehog, mole, etc.) are the half-apes (*prosimi or lemurs*).

III. Nearest to these of the true, tailed apes (*simiæ or pithecі*) are the Western New World monkeys (*platyrrhinæ*); then follow the higher Eastern apes of the Old World (*catarrhinæ*), first among these the dog-like apes (*cynopitheci*).

IV. The tailless anthropoid apes form the transition from these to man. Four different species are still extant in the tropics of the Old World, the gibbon and orang in Southern Asia, the chimpanzee and gorilla in Central Africa.

V. The standard for the proper estimation of the much-discussed relationship between these anthropomorphous apes and man is to be found in the important pithecometric proposition enunciated by Huxley (1863): "Whatever system of organs be studied, the comparison of their

anatomy leads to one and the same result—the structural differences which separate man from the anthropoid apes are not so great as those which separate the anthropoids from the lower apes."

VI. The much-mooted question of the *descent of man from the ape* must therefore be regarded as an established phyletic hypothesis, no matter from what branch of the legion of primates the oldest primitive man is derived. For under all circumstances the anatomical embryological unity of the primates is beyond question.

VII. Even if this monophyletic descent from the primates is disputed and the origin of the human race derived from another, unknown group of mammals, there still can be no doubt of the common origin of the whole class. And always there will have to be interposed a hypothetical group of extinct man-like apes between man and his old insect-eating ancestors.

Every impartial observer, in comparing the human skeleton with the skeletons of the gorilla, the chimpanzee and the orang standing next to each other in the Phyletic Museum of Jena or in any other large anatomical collection, cannot but be struck by the close morphological resemblance between man and the anthropoids, both

in whole and in detail. The structure of all is the same—the same number of bones, the same arrangement and combination of bones. The differences between them are merely the result of the differences in stature, and consequently the differences in the proportions of the individual bones.

Evidences from Histology.—Just as man and the anthropoid apes are essentially alike in the larger structural features of their organs, they are alike even in a higher degree in their finer microscopical features, in their tissue formation, in the millions of cells of which they are made up. No matter whether it is the fibres of the nerves or the muscles that are examined under a high-power microscope, whether the tissue-forming cells of the bones or the cartilage, whether the glands of the liver or kidneys, in each case the organization proves to be the same in man as in the higher mammals. The most characteristic thing is, that the mammals have all lost the nuclei of their red blood corpuscles while these are preserved in the other vertebrate animals. Likewise there is essential similarity in the skin covering of the mammals, that is, the peculiar structure and development of the hair, which is different from the corresponding horny structure of feathers,

covering the skin of birds, and of scales, covering the skin of reptiles.

Among the various groups of mammals manifold differences, it is true, have evolved in these very surface cell-formations, which are most exposed to the influence of environment; as also in some other cell-forms, for example, the male sperms. But this is of secondary importance compared with the fact that there is essential identity between the entire tissue-structure of the human body and that of the rest of the mammals, especially the primates. This agreement both in finer histology and grosser organology proves the descent of all the mammalia, including man, from a common stem-form, an *architherium* of the Triassic period.

Evidences from Physiology.—All the known life-manifestations of the human body are conditioned by the anatomical and histological structure of its organs, and by the chemical composition and physical nature of its cells, just as are the life-manifestations of the bodies of all the other mammals. Each activity of these millions of cells and of the tissues made up of these cells follows as a consequence of the laws of physics and chemistry, which apply equally to man and all other organisms. Modern cellular

physiology (Max Verworn), therefore, regards the life of man, like that of all other living beings, as a purely physical phenomenon in the largest sense. So we have no reason to assume, as vitalism does, a special "vital force" as the last cause of life in man, any more than in the other vertebrates.

Comparative physiology teaches us, in addition, that mammals as the most highly developed class of vertebrates are distinguished from the other classes by several special peculiarities, among which in particular is the special form of respiration and blood circulation. It is only in mammals that the arterial blood enters the body from the left ventricle through the left aortic arch; in birds the arterial blood enters the body through the right aortic arch. In the older reptiles, from which both classes have sprung, both aortic arches, the right and the left, have preserved their original function. And again it is only in mammals that the chief muscular agent of respiration is the diaphragm, because it is in this class alone that the diaphragm forms a complete partition separating the thoracic cavity from the abdominal cavity.

What is of special importance as an exclusive characteristic of mammals is the secretion of milk in the glands of the breast (mamma) and

the nourishing of the young by suckling. The reason that this form of feeding the young, from which the class derives its name, is so important, is that it establishes a peculiarly intimate relationship between mother and offspring and in many ways influences other vital functions besides eating. Mother love, rightly held to be a family relation of the highest importance, most nobly expressed in the pictures of the Madonna and Child, and inspiring an endless number of works of art, is no less developed, we know, among apes than among man. The milk-producing glands and teats of apes and men are exactly the same in structure and development.

Evidences from Embryology.—It is in the facts disclosed by human germ-history (embryology or ontogeny), in the individual development of every human being from the very beginning of his existence, that some of the most important answers to the cardinal question of the descent from the primates are found. Were these astonishing facts that have been accurately ascertained within the last fifty years generally known, and were they given the attention they merit, especially by dualistic philosophy, the much-disputed "descent of man from the ape" would long ago have obtained general recognition. Having

fully set forth and copiously illustrated these facts of embryology in the first part of my *Anthropogeny* (1874), and having applied them extensively in other writings, I will here merely name the twelve groups of embryological phenomena that are of the highest general importance.

1. Every man, like every higher animal, originates from a simple globular cell, the stem-cell (*cytula*), a ball of protoplasm containing a nucleus, about 0.2 mm. in diameter, appearing to the naked eye as a fine point.

2. This stem-cell, the so-called impregnated ovum, or the first segmentation globule, originates at the moment when the female egg-cell of the mother meets the male sperm-cell of the father and the two completely coalesce.

3. This moment of fertilization, or, more precisely, this moment of the fusion of the nuclei of the two copulating sexual cells, marks punctually the commencement of the newly-begotten individual's existence.

4. The inherited personal qualities of every human being are transmitted to the new stem-cell through the nuclei of both parent cells, the individual characters of the mother and both her parents being conveyed by the nucleus of the egg-

cell, and those of the father and both his parents by the nucleus of the male sperm-cell.

5. The repeated division of the stem-cell immediately following fertilization or the fusion of the two parent cells gives rise to the "segmentation cells" united into a spherical germinal body (*morula*), which then undergoes the important process of gastrulation.

6. The significant embryonic form growing out of this stage, the *gastrula* or germ-cup, consists of two cell layers, the two primary germ layers which contain the first "primitive organ," the primitive intestinal cavity and mouth.

7. The gastrula is succeeded by the significant germ or larva form of the *chordula,* whose body is composed of four secondary germ layers and six primitive organs. This embryonic form is of substantially the same structure in all the vertebrates.

8. In the further course of embryonic development the chordula gives rise to the characteristic germ form, *sandalion,* resembling a sandal or the sole of a shoe. This form is common to all the amniotes, the three higher classes of vertebrates, reptiles, birds, and mammals.

9. The human embryo in its later development from the sandalion remains so strikingly like the embryos of the other higher mammals

(especially apes, half-apes and dogs), even after the formation of the head and the sense organs, and the two pairs of limbs, that they cannot be told apart.

10. This similarity between man and the anthropoids both in outer form and inner structure continues long after the embryos reach a stage of development clearly distinguishing them from the embryos of the other mammals.

11. There are certain striking peculiarities in embryonic development, especially the formation of the umbilical cord and the placenta, which are common only to man and the anthropoid apes. In the lower apes and the other mammals the corresponding developments are different.

12. The whole course of embryonic history, the grosser as well as the finer relations of organ and tissue building, is essentially the same in man as in the man-like apes; so that comparative embryology proves the close relationship of the two groups of primates just as clearly as comparative morphology, histology, and physiology.*

* The facts revealed by the study of human embryology are still too little known among educated laymen. Yet their importance in the solution of the "human problem" cannot be overestimated. I have described and illustrated them fully in "Human Germ-History" (in the first volume of my *Anthropogeny*). Compare also my shorter works, especially the pamphlet *Sandalion: an Open Reply*

Evidences from Paleontology.—The petrifactions, or fossils, found in large numbers in the sedimentary strata deposited by the water, are the indestructible remains of the animals and plants that once lived and grew on the earth. They are tangible historic "documents," and they alone give us a direct account of the life and structure of the long-extinct organisms that peopled the surface of the globe during many millions of years. But it was not until very recently that we have come to appreciate the importance of these records in the history of creation.

The geologists who studied the sedimentary rocks and were the first to learn of the fragments of skeletons and impressions of fossil organisms locked within those rocks, looked upon these remains as valuable marks for determining the relative age and historic order of the various strata superimposed on each other. The science of petrifaction or "petrifactology" based upon these finds, consequently, was connected with mineralogy and geology and was counted among the

to the Charges of Falsification by the Jesuits (Frankfort, 1910), containing a photograph of the human embryo twelve days old, the youngest human embryonic form thus far observed. The only adequate explanation of these embryologic manifestations is that offered by the fundamental law of biogenesis. (*General Morphology,* Vol. II, 1866.)

"inorganic" natural sciences. The biologists did not awaken to an appreciation of the extraordinary value of these animal and plant remains from their direct connection with the animals and plants still extant until Darwin, in the middle of the nineteenth century, gave us the key to the history of descent. Then out of descriptive petrifactology began the development of the truly enlightening science of paleontology: then came an intelligent insight into the true relations that the ancient fossil organisms bear to the organisms of to-day, either as their direct ancestors, or as near of kin, or as collateral branches on the genealogical tree.

Within a short time this new biological science developed into an independent branch of the doctrine of evolution; and during the past half century it has been enriched by an amazing wealth of remarkable discoveries. Unfortunately this empiric material is full of gaps.* The valuable fossil remains, though genuine "memorial coins of creation," furnish only an incomplete idea of the whole appearance and structure of prehistoric life. They are only fragments or partial impressions. Nevertheless they are the direct witnesses to the remarkable old world that peopled this

* The reasons of these gaps are given fully in the sixteenth chapter of my *Natural History of Creation.*

earth in the past, and so they possess the greatest historic significance. They are of particular value in tracing out the genealogical history of the vertebrates.

THE ANTHROPOLOGICAL FOUNDATION.—Everything that we know and believe, our whole conception of the world, of philosophy and religion, are conditioned first and foremost by the nature of the organs through which man receives his knowledge, his senses and his brain. In so far true anthropology, in the widest sense, is the indispensable preliminary to all the other sciences. Long ago, more than four centuries before Christ, it was said by the Greek sophist Protagoras of Abdera that "man is the measure of all things." Like his predecessor, Heraclitus, he was of the conviction that the world was in a state of constant flux and consequently all knowledge of the world could only be relative—an anticipation of the fundamental principle of the modern Theory of Relativity (in the widest sense). Chief among modern philosophers to develop this pantheistic doctrine was the eminent monist, Ludwig Feuerbach (1840). In his *Anthropologismus* (1860) he showed that anthropology alone provides the standard for a true estimate of

dualism's three great ideals, God, free will, and immortality.

Recently the term anthropology has come to be much used in a narrower sense. Some stress as its true province the somatic sciences of man, anatomy and physiology, some the sciences of the human mind, psychology and sociology. In fact, many would have a so-called "exact anthropology" with its most important function restricted to an accurate description and accurate measurements of all the parts of the human body and to detailed analysis of racial differences, etc., thereby limiting its province considerably.

But monistic anthropology should be rationally construed in its widest sense to include the whole science of the human organism, its life and development. In this sense it was—with especial reference to the descent of man from the primates—that as long ago as 1866, in my *General Morphology,* I classed anthropology as a part of zoology. Now, if we bear in mind the tremendous value of comparative and genetic methods of research in all the studies of organic life, we shall be readily convinced that the anthropologic basis of our whole monistic philosophy can rest permanently only upon the firm substructure of comparative zoology.

THE ZOOLOGICAL SUBSTRUCTURE.—No other science has made such vast strides in the course of the last half century and so vastly extended its sphere of influence as the modern science of animals—zoology, in the broadest sense. The great Aristotle, the "father of natural history," it is true, recognized the comprehensive scope of that science more than two thousand years ago, and understood that the "History of Animals" should include an anatomic study of their bodies and of the evolution of their parts. But this fertile path of investigation was not pursued by any of his successors. When, in the sixteenth century, the great geographic discoverers brought to Europe a number of hitherto unknown animal and plant forms, the students of natural history occupied themselves chiefly with the description of innumerable individual species. The investigations of the inner bodily structure and development of animals began in the eighteenth century, independently of their work.

It was only in the nineteenth century, however, that scientists succeeded in penetrating more deeply into the great secrets of organic life. Neither the empiric zoologists and botanists nor the speculative philosophers of earlier days understood or approved the attempt of Jean Lamarck in his *Philosophie zoologique* (1809) to

unify the organic world and to explain the natural origin of the countless species of the plants and animals by the theory of evolution. It was not until after Charles Darwin, fifty years later, published his *Origin of Species by Means of Natural Selection* (1859) and combined all the phenomena of organic life under one great unifying principle, that the theory of organic evolution gained recognition. Now it became possible to replace the "traditional, supernatural creation myths" with a *Natural History of Creation* (1868),* and to combine all the different branches of zoology and botany, morphology and physiology into one comprehensive monistic biology by means of the theory of evolution.†

Unity of the Vertebrates.—In the begin-

* Ernst Haeckel: *Natürliche Schöpfungsgeschichte,* Jena, 1868.

† In my address, *Ueber Entwicklungsgang und Aufgabe der Zoologie,* which I delivered in 1869 on entering the Philosophical Faculty of Jena, I have tried to give a comprehensive summary of the main groups of the biological sciences, the chief object of which, both in zoology and botany, was henceforth to be the study of the *whole* of organic life under the guidance of our new theory of evolution. Only by the comparative study of the whole of this great *bios* and by connecting it with the principles of monistic philosophy is it possible to establish anthropology on a firm foundation and to apply it in the solution of the cardinal question.

ning of the nineteenth century the great Lamarck, the founder of the theory of descent, separated the six animal classes of the old Linnæan system (1735) into two principal natural groups. His vertebrates comprised the four higher, his invertebrates the two lower classes of Linnæus. All zoologists after him have recognized this important division, confirming the natural unity of the vertebrate group from every point of view—Cuvier (1802) confirming it on the basis of comparative anatomy; Baer (1828), by his work on the comparative history of evolution; Johannes Müller (1833), by comparative physiology.

When later, in 1859, the theory of evolution was established by Darwin, and the importance of "a natural system of classifying animals and plants expressive of their hypothetical genealogical tree" was recognized, I was the first, in my *General Morphology* (1866), to attempt a recast of the whole zoological and botanical systems on the basis of descent. I represented the vertebrate stem, whose origin from a group of invertebrates then still seemed doubtful, as a closed unit in this phyletic sense. In the *Natural History of Creation* (1868) this monophyletic conception of the vertebrate group and the relations of the different classes to each other

are presented in popular form, and the third volume of my *Systematic Phylogeny* (1895) offers an exhaustive scientific treatment of the same subject, the new phyletic system of the vertebrates. Its fundamental features have since been accepted by most zoologists. In particular, the phylogenetic unity of the whole vertebrate stem, from the lowest acrania and fishes up to the apes and man, is almost universally conceded.

This deduction is of decisive importance in the monistic answer to our cardinal question. No matter how the details of the vertebrate genealogical lines may be interpreted, nor how differently the mutual relations of the smaller groups may be construed, man remains a true vertebrate in all his relations to the rest of the members of the group. He is incontestably a mammal standing at the head of the group; and the primates, with the anthropoids at their head, are his nearest relations. Inasmuch, then, as the fundamental features of the vertebrate genealogical tree are definitively established by the paleontological series-sequence of its main groups, the cardinal problem is thereby alone definitively solved for all time.

The Vertebrate Classes.—The four main groups of the higher animals which Linnæus di-

vided into classes and which Lamarck (1801) combined under the one concept of vertebrates, were the fishes, amphibians, birds, and mammals. Later the amphibians were separated into two classes, after it was shown by Baer that the true amphibians (salamander and frog) are more nearly related to the fishes, while the reptiles without gills (lizard, crocodile, etc.,) are more nearly related to the birds. I increased the number from five to eight (1866) by showing that the old class of fishes falls into three different groups. The two lowest divisions, which Johannes Müller in his reformed scheme of the classification of fishes had previously grouped into separate orders, differ far more from the true fishes than these differ from the rest of the vertebrates. They are distinct classes belonging to a much lower and older level of development. The acrania, represented by a group of lancelets (*amphioxidæ*), have to this day preserved the oldest primitive structure of our stem in but slightly changed form. In my *Anthropogeny* (chapters XVI and XVII) I have demonstrated the importance of a thorough knowledge of amphioxus as the oldest and lowest vertebrate. Amphioxus leads us to surmise the origin of the group from the invertebrate chordata.

The second class of jawless vertebrates, the

roundmouths (*cyclostoma*)—still represented by the lampreys (*petromyzontes*)—form the transition from those acrania to the true fishes (the primitive fishes, ganoid fishes and teleostei or osseous fishes). And the mud-fishes (*dipneusta*), as possessing pulmonary respiration along with gill respiration and so forming the transition to the amphibians, may also be considered as a class by themselves.

All these lower vertebrates are distinguished from the three higher classes, reptiles, birds and mammals, by the absence of a more fully developed brain. These higher classes have entirely dropped the original mode of gill breathing and have, in place of it, acquired special protective coverings for their embryos, the bag of waters, the amnion, and the outer layer of the bag of waters, the chorion. The distinct, unified character of these amnion animals began with the lowest reptiles and gave rise, on the one hand, to the birds, and, on the other hand, to the mammals.

The close affinity between the eight classes of vertebrates, which we thus distinguish in our phyletic system, has now achieved general recognition.

The History of the Vertebrates.—The history of our vertebrate ancestors, as far back

as it can be traced directly in the fossil vertebrate remains, yields a number of phylogenetic facts of the highest importance. The genealogical sequence of the vertebrate group, that is, the succession empirically established in which the different classes and orders of vertebrates appear one after the other in the long course of the organic history of the earth, is of the greatest moment for a clear answer not only to our cardinal question, but to the other great general questions of natural philosophy associated with it. Since I have treated these questions in full in the *Anthropogeny* (1874) and in the jubilee work *Our Ancestral Series* (1908), I shall here confine myself to the following salient points:

I. The oldest known fossil remains of vertebrates have been found near the top of the Upper Silurian. They belong to the true fishes of the two subclasses, selachians and ganoids.

II. In the succeeding Devonian period, which must surely have lasted several millions of years, our stem is represented solely by true fishes (primitive fishes and ganoids). Next come the first air-breathing mud-fishes (*dipneusta*), transition forms to the amphibians.

III. The oldest amphibians, the *stegocephala,* first appear in the Carboniferous formation—small batrachians resembling our salamanders,

with a scaly coat of mail and two pairs of short legs with five-toed feet, the oldest land vertebrates.

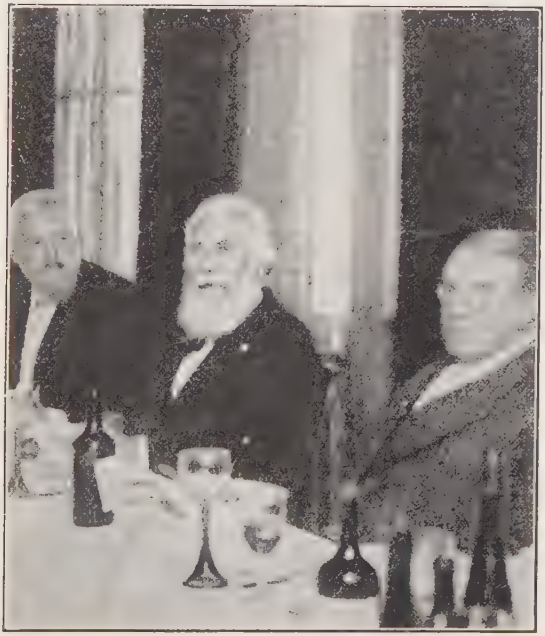
IV. They are followed in the Permian by the first reptiles, resembling small lizards, nearest of kin to the hatteria of New Zealand. The duration of the above-mentioned four geological periods, together composing the Paleozoic age, is estimated at from thirty to forty millions of years at the least. During all that immense stretch of time no mammals as yet existed.

V. This highest class does not appear until the following Mesozoic age, which lasted from about ten to twelve millions of years and included three geologic systems, the Triassic, Jurassic and Calcareous. The Mesozoic saw the development of the mighty domination of the reptiles.

VI. The scant traces of the fossil remains of mammals found in these Secondary strata all belong to the small, lowly organized mammals, monotremes, marsupials, and mallotheria.

VII. In the Calcareous period the mallotheria, closest to the present insectivora, contained the stem forms of the higher mammals, the placentals.

VIII. The rich and manifold developments of this last subclass took place in the succeeding Cenozoic or Tertiary age, the duration of which



Haeckel's house in Jena (above), and a group at the banquet of the Monist Congress in 1911. Left to right: Wilhelm Ostwald, Ernst Haeckel, Thaddeus B. Wakeman

is estimated at a minimum of from three to four million years. Not until then, in the Eocene, did those primates appear which are represented by the low half-apes (*lemurs*).

The Race History of the Primates.—The phylogeny of the primates, naturally of the highest interest to our cardinal problem, is not supported paleontologically by as large a mass of tangible fossil remains as is that of other groups of the higher mammals, rich in forms, especially by the carnivorous and the hoofed animals. Fossils of primates are relatively rare and usually incomplete, due chiefly to their arboreal habits. Most apes and half-apes spend their lives climbing about on trees, and death rarely overtakes them in a position favorable to the preservation of their delicate skeletons in whole or even in part. Nevertheless, a number of fossil fragments of skulls and skeletons have been unearthed, especially in very recent times, from the Tertiary rocks (the oldest half-apes from the Eocene). These remains are of great interest for the hypothetical construction of the genealogical tree of the primates.

Special efforts have been made to find fossil forms intermediate between man and the anthropoids, the "missing link" that will fill out the sup-

posed lacuna between them. The discovery of the fossil *pithecanthropus erectus* in Java (1894), which may really be regarded as a direct connecting link in the chain of the primate ancestors, has occasioned a great deal of discussion. I have dealt with this subject more fully in my works mentioned above. My personal belief is that these fossil documents, recently found in larger numbers, do not possess the high value for the phylogeny of the primates usually ascribed to them. To students of science having a thorough knowledge of the comparative anatomy, physiology, ontogeny, and psychology of the primates and capable of forming an adequate and impartial phylogenetic estimate of them, the indirect evidence supplied by the "creation documents" is sufficient proof of man's descent from a series of extinct apes (and before them half-apes), even if not directly corroborated by these fossils.

The Invertebrate Ancestors of Man.—The fossil documents of the stem-history which paleontology supplies for the determination of our ancestral series are valid only for the second half of the progonotaxis, from the Silurian upwards. For the Silurian fishes (at first selachians resembling the shark) are the oldest vertebrates

with hard skeleton parts lending themselves to petrifaction. The older ancestors, the two lowest vertebrate classes (acrania and cyclostoma), had soft bodies without rigid skeleton parts. The same is true of the long series of our invertebrate ancestors, those long extinct invertebrate animals which, hypothetically, constitute the first and older half of the progonotaxis (before the Silurian). For the ascertainment of that half we have nothing to fall back on except the evidence of comparative anatomy and ontogeny. Here the fundamental biogenetic law has rendered us the most valuable and unequivocal service.

Various hypotheses have been set up concerning the different classes of invertebrate animals which can be included in this hypothetical, older, pre-Silurian series. The only certainty seems to be that the invertebrate animals nearest related to the oldest vertebrates are the tunicates; for only they develop from the egg the characteristic larval form of the chordula with its six primitive organs. We therefore combine the two stems, tunicates and vertebrates, into one group of chorda animals (*chordonia*), and differentiate them from the other invertebrate animals which follow quite a different course in their ontogenesis.

It seems certain also that the older progenitors of all these tissue animals have sprung from the worm stem (*vermalia*) and that the common ancestral forms of the metazoa are to be sought in the hypothetical stem form the gastræa. Their faithful picture has been preserved to the present day in the embryonic form of the two-layered *gastrula* common to all of them. These, again, may be derived from a series of the lowest unicellular forms, the protists, as I have shown in my *"Studies in the Gastræa Theory"* (1872-1876). At all events, all the multicellular animals and plants, all the *histona* (metazoa and metaphytes) must originally have sprung from protists, from one-celled stem forms. The proof of this phyletic hypothesis is the fundamental outstanding fact that in all of them, the ontogenesis, the development of the individual from the egg, begins with a simple egg-cell. The oldest protists, that is to say, the deepest roots of our genealogical tree, were plasmodomous primitive plants (protophytes); and from them later originated the primitive animals (protozoa).

The Savage and the Civilized Man.—The remarkable strides which so-called primitive or prehistoric history has made in the past eighty years, its connection with man's descent from the

primates on the one hand, and with ethnography and the history of peoples on the other, above all the recognition that anthropology is a part of zoology, have deepened and extended our knowledge of the nature and evolution of the human race to a degree undreamed of before. We now know positively that man has originated from a long series of mammalian ancestors, and that it is by ascending evolution and a gradual process of perfection through millions and millions of years, that he has come to be what he is. We know just as positively, too, that man has not sprung from the hand of a divine Creator by a supernatural act of "creation," and that he has not dropped from his original perfect (godlike!) state by a mysterious "fall."

The entire course of humanity's evolution, like that of all organisms peopling the planet, is thus seen to follow, on the whole, the law of progress, not of regress. This is beyond question, notwithstanding the deplorable interruptions which the good and useful progressive development of civilization repeatedly suffers by intervening periods of bad and harmful regressive development.

An accurate knowledge and correct estimate of the older and lower stages of human cultural development are of the greatest importance to a

correct evaluation of man's nature and a proper appreciation of the "monistic anthropology" based thereon. It was, and to this day is, one of the greatest defects of the dualistic philosophy, blinded by the dogmas of ontheistic religion with which it is associated, that it ignores those facts. In its speculations on human psychology, especially in connection with the so-called "theory of knowledge" and the "exclusively human sciences" as distinguished from the natural sciences, it starts out from the highest developed psyche of the modern civilized man and simply transfers the complicated phenomena therein observed to man in general. Yet a true comprehension of these phenomena can only be achieved by a thorough and critical comparison of them with those of the rude man of nature. The special intellectual qualities by which man as such is said to be distinguished from the beast, especially from the nearest related mammals, are products of millennia of culture. They are absent in the lowest savage because not yet developed.

Races in the World War.—Many new and incredible things have happened in the gigantic world war to surprise twentieth-century humanity. One of these, fraught with grave consequences, is the way in which England has mobil-

ized all the different races of man. . . . First come the yellow, slit-eyed Japanese; then the Mongols from Indo-China, and the brown Malays from neighboring Malacca and Singapore; the dark-brown Austral Negroes and Papuans from Oceanica, the Kafirs from South Africa, and the Senegal Negroes from the North African colonies. And that no shade may be lacking in the color scheme of the "inferior" races . . . the remnants of the Redskins are dragged from America to the blood-steaming battlefields of Europe. . . . Deep students of ethnology and far-sighted statesmen point with anxiety to the grave consequences that are sure to follow this "fraternalization" of all the races both to England herself and to the supremacy of the white race as a whole. For the cultural and psychological differences that separate the highest developed European peoples from the lowest savages is greater than the differences that separate the savages from the anthropoid apes.

CHAPTER IV

THE WORLD WAR AND THE DOCTRINE OF EVOLUTION

Value of the Evolution Doctrine—Doctrine of Evolution and Creation (Genetics and Creationism)—Continuous and Saltatory Evolution—Progress and Regress (Progressive and Regressive Evolution)—Evolution of Human Society—The Fundamental Biogenetic Law—Mechanical Embryology—Universal Doctrine of Evolution—History of the Evolution Theory—Evolution and Sociology—Association and Morality—Gravitation and Affinity—Cellular Sociology—Cellular and Historial Ethics—Vertebrates and Articulates—The Future of Evolution—Hopes of Peace—Freedom of Thought—The Harvest of the World War.

VALUE OF THE EVOLUTION DOCTRINE.—Towering above all the achievements of the "Century of Science," the proud title that the nineteenth century owes to its immense extension of the knowledge of the world, are the two general laws of the "Eternity of the World" (law of substance) and the "Evolution of the World" (genetics). The law of substance asserts the eternity and persistence of matter, energy and psychom, the indestructibility of the universe as a whole. Contrariwise, the theory of the evolu-

tion of the world proves the impermanence, the perishability of its individual parts. It proves the eternal becoming and passing of all separate individual existences.

It was not until the middle of the nineteenth century that the two laws gradually achieved general acceptance—not until the remarkable advances in physics, chemistry, and geology gave them a solid empirical foundation.

These two fundamental laws of modern science find their most universal application in monism, since monism is the unified philosophy of the universe that bases itself exclusively upon the logical conclusions of "pure reason" and scientific experiment, unalloyed with mysticism and miracle faith. So, William Ostwald, president of the Monist League, was quite justified in calling the present century the "monistic century," the phrase he used at the Monist Congress in Hamburg (1911).

With equal aptitude it might be styled the "genetic century," since it is only now, after long and arduous struggles, that our principles of natural evolution or genesis have received general recognition from persons of education who are free of prejudice and whose minds are unbefogged by traditional beliefs. The true value of this modern science of genetics, the doctrine

of evolution, cannot possibly be overestimated, because natural evolution is in reality the "magic key to all the riddles that surround us, or, at least, the key that will open the gate leading to their solution." This is generally admitted to be true in the most important natural sciences, especially biology and anthropology. But it is equally valid in the distinctively human and social sciences, which in my opinion are not to be divorced from the others. They are inseparably linked by the discoveries of anthropogeny.

Doctrine of Evolution and Creation (Genetics and Creationism).—The crowning achievement of the monistic theory of evolution, which plays so important a rôle in the whole of science and particularly in philosophy, is its triumph over the traditional belief in creation. Most of the older attempts that thinking men made, for more than three thousand years, to comprehend the origin and history of the world proceeded on the erroneous assumption that a rational "creator" consciously and intelligently created the universe, the earth and its living "creatures," according to a purposive design. This personal creator, the God of the Schools (*Ontheos*), was endowed with the technical qualities and capacities that artists have who work with the definite purpose

of creating paintings or statues. Although the circumscribed anthropism of this creation myth, with all its misleading consequences, was plainly palpable, nevertheless belief in supernatural creation was prevalent and widespread. It received support in dualistic philosophy through Plato's doctrine of ideas, and in the Christian religion through the persistent vogue of the Mosaic story of creation based on the Old Testament. In this form it is still taught in most of the churches and schools of the modern civilized world.

It was only in the past century that its mouldy foundations were gradually shaken, and at last completely overthrown, by the progress of natural genetics. It had finally become perfectly obvious that the alleged personal God had no existence and that the whole cosmos had evolved unconsciously of itself, in obedience to eternal natural laws inherent in substance. Thenceforth the monistic conception "God-Nature" (*Theophysis*) as first clearly and loftily conceived by Giordano Bruno and Spinoza and later by others, especially Goethe, replaced the mystical and dualistic notion of a "Maker of the World" (*Demiourgos*), which Plato had successfully introduced into the cosmogony four hundred years before Christ.

Both from an esthetic and a cultural historical

point of view it is natural and justifiable that this anthropistic myth and the whole of mythology connected with it should be preserved as imaginary fiction in the teachings of the church and in poetry. But we must insist that it should no longer be obligatory to teach it to school children as the truth, and should not be imposed on the intelligence of the developing soul as a binding creed. Natural genetics must take the place of transcendental creationism. As "natural history of creation" it will have a far more enlightening and ennobling influence on the development of the individual than will the mythology of "supernatural creation." The exalted object of *our* devotion and veneration must be the All-God (*Pantheos*).

Continuous and Saltatory Evolution (*Evolutio continuata et saltata*).—All evolution is in the last analysis continuous. Every phenomenon has its natural cause and is the effect of antecedent phenomena. This is a fundamental principle of evolution recognized long ago in the old dictum, *"Natura non facit saltus,"* nature makes no leaps. It is really a self-evident thesis, being the direct outcome of the general law of causation, or, concretely expressed, of our "law of substance." All occurrence in the universe,

conceived as an eternal metamorphosis of substance, is continuous, unbroken. If, in contrast, certain occurrences seem to take place suddenly and appear to be new and uncaused, this is due to a striking acceleration of an evolutionary process, or to our ignorance of the causes. So-called saltatory evolution is merely apparent. It is never uncaused or supernatural, never a "miracle."

Formerly inexplicable miracles played a great rôle not only in mythology but even in science, remaining in geology as late as the first part of the nineteenth century, after Cuvier introduced his catastrophic theory, the doctrine of repeated sudden destructions of the organic inhabitants of the earth and their miraculous re-creations.

It was not until 1822 that this was refuted by Carl von Hoff (Gotha), and more thoroughly in 1830 by Charles Lyell. Both geologists showed that the supposed sudden "revolutions of the earth" did not signify an interruption but merely a temporary acceleration of its development. Later, when Charles Darwin (1859) by his theory of selection showed that the origin of species in the plant and animal kingdoms is not to be explained by miraculous creation but by the gradual transformation of species, the continuity of evolution had to be admitted as proved

in this field also. Various attempts, it is true, were again made to substitute saltatory for continuous evolution. Sudden transformations, called mutations, were said to disprove the continuous evolution of species. Nevertheless, here as in the sudden cataclysms in the cosmos (for example, the appearance of new stars), the changes are due to mechanical causes known to us only partially or not at all. Goethe's saying, "Nature can attain what she desires only in sequence; she makes no leaps," is shown always to be valid. In other words, "the genesis of substance is always and everywhere a continuous metamorphosis, never uncaused or saltatory."

Progress and Regress (Progressive and Regressive Evolution).—An impartial examination of the history of species readily proves that upon the whole it follows the law of progress. The fossil documents of paleontology offer tangible proof of the fact that in the long course of the earth's organic history there went on a slow process of perfection (*teleosis*) in the plant and animal organisms whose petrified remains are buried in the successive strata of the earth's crust. The period that it took to form the deposits of these Neptunian mountain masses must surely have covered more than hundreds of millions of years,

thus affording sufficient time for the plasm to bring forth the wonderful forms of organic life in ever-increasing numbers and complexity. In each plant and animal group only a few small lower forms appear at first. Their growth in size and perfection keeps pace with the complexity of their structure, until finally a point is reached beyond which they cannot pass. Then the series usually dies out and another appears in its place.

However, this general progress in the evolution of organic life is often interrupted by individual retrogressions due to adaptation to less favorable conditions of life or adaptation to special interrelations among organisms, for example, a parasitic sedentary mode of life. As a rule these progressive and regressive metamorphoses are connected with the phenomena of division of labor (*ergonomy*) and the corresponding phenomena of morphological differentiation (*polymorphism*), both of such import in phylogeny.

In the twelfth chapter of the *Natural History of Creation* I have shown that this divergence of character in the origin of new species and in the differentiation of tissues and organs is the necessary mechanical effect of the process of selection discovered by Darwin. It needs no metaphysical entelechy, no purposive "creation plan," such

as dualistic teleology assumes, to explain them. In fact, the presence of rudimentary or vestigial organs, purposeless parts of the body that have arisen through disuse, is sufficient to disprove the teleological contention. Dysteleology, the instructive science of these useless vestigial organs, the doctrine of purposelessness, furnishes a strong support to our mechanical biology and monistic philosophy.

Human Society.—The marvelous extension of our knowledge and the consequent perfection of our world philosophy, resulting from the nineteenth century evolution doctrine, have brought home to us the conviction that the civilization and the life of nations are governed by the same laws as prevail throughout nature and organic life. The development of human civilization and of the state is a direct continuation of the history of the vertebrates from whom we are descended. As in the phyletic evolution of the organic world, long periods of gradual progress are followed by sudden accelerated revolutions, so it is in the history of nations, the "History of the World," as men call it in their anthropistic conceit. Important accelerations of this sort took place in vertebrate phylogeny in the Carboniferous period, when the first four-legged land

amphibians evolved out of the fin-swimming aquatic fishes; in the Trias, which saw the origination of the warm-blooded mammals from the cold-blooded reptiles; and in the Tertiary, which marked the rapid rise of the class mammalia to a high level of development, culminating in the primates, the most important branch of the stem. Similar turning-points are observable in history in the fifth and sixth centuries B. C., when the flower of classic Greek civilization began to unfold itself; in the commencement of our era, when Christianity transformed civilization; in the fifteenth and sixteenth centuries, when the Renaissance and the Reformation put an end to the darkness of the Middle Ages; and, finally, in the nineteenth century, when the idea of evolution struck root in all fields of intellectual life, and the sweeping social and political changes beginning with the French Revolution turned the entire life of the nations into new channels in the pursuit of new goals.

The Fundamental Biogenetic Law.—The phenomena of the development of the vertebrate body from the impregnated ovum, capable of being directly observed, are the most striking phenomena in organic evolution. They have excited men's interest from way back in ancient

times, particularly in the hen's egg, which takes three weeks to develop, and in fishes and frogs. More than two thousand years ago Aristotle, the "father of natural history," recorded many observations on this subject. His work on *The Generation and Development of Animals* was up to the seventeenth century almost the only source of information in this field. But it was not until the advent of the two German embryologists, Caspar Friedrich Wolff (1759) and Karl Ernst von Baer (1828), that more accurate observations were undertaken and an attempt made at theoretical interpretations.

A real explanation of these wonderful processes became possible only after Charles Darwin (1859) had made known the natural origin of species. On this basis the distinguished German scientist Fritz Müller (Desterro, 1864) showed by the classic example of the crustaceans that the agreement in the embryonic development of all the members of this group can be explained only on the assumption of their descent from a common stem form. Later, in my *General Morphology* (1866), I showed that this significant parallelism between individual and phyletic evolution is found throughout the animal kingdom, and, accordingly, I laid down the "Fundamental Law of Biogenesis." The shortest expression of

this law is: "Ontogeny is a brief and rapid recapitulation of phylogeny." In the *Anthropogeny* (1874) I worked out in detail this fundamental principle of organic evolution by the examples of the human organism. Finally I tried to show in my studies on the gastræa theory (1872-1876) that the common descent of all metazoa from the hypothetical gastræa may be inferred from the agreement of their gastrula form.

In this and in other works referred to there and partly also in the *Building-Stones of Monism* (1914) I have dealt exhaustively with the reasons that justify us in regarding this much-discussed "Recapitulation Theory" as a general fundamental law of all organic processes of evolution. The race history is the mechanical cause of the embryonic history. Without the first the latter could not be. There is the most intimate causal connection, a direct causal nexus, between the two branches of biogeny (the organic history of development in the widest sense). That is why I regard all the objections so far raised against it, especially by the adherents of a false "Mechanical Embryology," as negligible. The claim some of them make, that the universal fundamental law is merely a "biogenetic rule," an "accidental occurrence" possessing no deeper

significance, proceeds mainly from their failure to take due account of the paleontological documents and of the important difference between palingenesis and cænogenesis (compare Dr. Heinrich Schmidt, *Haeckel's Biogenetic Law and Its Critics,* Odenkirchen, 1902).

Mechanical Embryology.—The mechanical explanation of phenomena, that is, their reduction to unconscious, efficient causes, is the only explanation that for the last four centuries has been admitted to be valid in the anorgic world (in the whole of inorganic physics, including chemistry). In biology it was different until fifty years ago. Some of the organic phenomena of life, especially the activity of the soul and the processes of development, seemed to be insusceptible of a purely mechanical interpretation. Here it was believed necessary to assume, in the sense of vitalism, conscious purposive causes (*causæ finales*), a supernatural "vital force" acting consciously. Philosophy was thus confronted with the dilemma of having to be monistic in respect of the anorgic world and dualistic in respect of the biologic world (which from the standpoint of time and space is only a minute fraction of the entire world).

This palpable contradiction was not removed

until the modern theory of evolution also found a purely physical explanation for the most difficult and complicated processes of biology and psychology by tracing them to mechanical causes. I myself made the first attempt in that direction fifty years ago in my *General Morphology of Organisms,* the object of which is indicated on the title page, *General Principles of the Organic Science of Forms Mechanically Interpreted by the Theory of Descent.* By demonstrating the causal nexus everywhere existing between individual and phyletic development, and by explaining the former as a condensed recapitulation of the latter, the fundamental law of biogenesis solved the most difficult problem of "mechanical embryology" in the truest sense.

Ten years later an attempt was made to solve this problem quite differently, by explaining the complex phenomena of ontogenesis independently, as having no relation to phylogenesis (Wilhelm His, among others). The most complicated phenomena in embryonic development are reduced to simple physical processes, while the history of the stem is entirely ruled out as a factor in those processes. Special stress is laid on the establishment of this misleading "tectogenetics" on an experimental basis. I have shown the futility of it in the sixteenth chapter of *The Won-*

ders of Life, and in my work, *The Aims and Ways of Modern Evolution* (1875), I have given a full exposition of its principal errors. Embryological experiments may furnish valuable contributions to physiology and pathology, but can never explain the historical processes of phylogenesis, which is briefly recapitulated in ontogenesis and which can be understood only in the light of paleontology and comparative anatomy.

Universal Doctrine of Evolution.—To this day there is no work giving a comprehensive and fundamental account of the general theory of evolution—a real "Universal Genetics"—the application of the monistic evolutionary idea to all branches of human science. This lack is due, firstly, to the peculiar history of genetics or of evolutionism itself, and, secondly, to the very different parts taken in it by the various sciences involved.

There is, first of all, the fatal and oft deprecated antagonism between natural science and the exclusively human sciences, between real empiricism and ideal philosophy. Despite the ardent efforts of half a century to bridge over the unnatural gap which divides them and which is equally injurious to both, and to effect their harmonious union in a strictly monistic natural

philosophy, we are still far from the attainment of this desirable goal. On the one hand empiric research, as *exact* science, loses itself more and more in one-sided specialization, in minute descriptions of the countless individual facts which the vastly extended field of observation has opened up to it; in so doing it loses sight of the whole, and the ability to grasp general laws. On the other hand *speculative* philosophy, as the comprehensive science of world-conception, manifests no inclination to acquaint itself with the results of special investigation, and in its airy flights in the clouds loses the solid ground from under its feet. This is especially true of the relation of abstract metaphysics (especially German ideal philosophy) to the magnificent discoveries of modern evolution. By ignoring it or shoving it aside, by expressly refusing to recognize its greatest triumph, the successful solution of the cardinal problem, it deprives itself of the best means of ascertaining the highest natural laws. Thus it comes about that often in our universities one and the same branch of science, particularly psychology or evolution, is taught from diametrically opposite points of view by monistic scientists and dualistic philosophers.

Seventy years ago the great Alexander von Humboldt conceived the magnificent plan of a

comprehensive *Physical Description of the World.* Yet, for his *Cosmos* he could not draw upon the invaluable treasures of the science of evolution, as these were largely an acquisition of the second half of the nineteenth century. It will be one of the most profitable, though also one of the most difficult, tasks of the new monistic natural philosophy to draw up a sketch of the *Physical Evolution of the World* in the same sense and in the same complete form. In my attempts in my *General Morphology* (1866) and in my later works, especially *The Riddle of the Universe* (1899), I could only indicate the general lines along which a universal *Genesis* should be carried out.

History of the Evolution Theory.—So far the greatest obstacle to the writing of a *Universal Genetics* has come from the fact that different branches of the evolutionary doctrine originated at different times and in different ways. While a *Celestial Natural History* (Kant-Laplace) was already outlined in 1755-1796 and a *Historical Geology* (Karl von Hof, Charles Lyell) in 1822-1830, it was not until 1859 that a history of the evolution of the organic world was made possible by Darwin's reform of Lamarck's theory of descent (1809); and it was

not until 1863 that the most important inference was definitely deduced from it, namely, that man is descended from the primates. Moreover, in these four main branches of genetics, astronomy, geology, biology and anthropology, the special knowledge in each and the methods of acquiring that knowledge are so different, they are so extensive and lie so far apart, that the beautiful task of uniting their general essential features into one composite picture requires not only a general acquaintance with the whole but also a keen critical philosophical sense.

I have elucidated more fully the problems of such a genetic picture of nature in my essay, *A Contribution to the Doctrine of Evolution* (1912), which appeared in the Frankfort magazine, *Das Freie Wort* (Vol. 12. No. 18). It is reprinted in the first part of my *Building-Stones of Monism* (1914, p. 159), which is divided into four main parts: 1, *Cosmogony* (=astronomical genetics, or evolution of the cosmic structure); 2, *Geogeny* (=terrestrial genetics or historical geology); 3, *Biogeny* (=biological genetics or evolution of the organic world); 4, *Anthropogeny* (=anthropological genetics, phyletic and ontogenetic history of man). To these four main groups may be added the following as of special importance: 5, *Psychogeny* (=psychological ge-

netics, the science of the evolution of the soul); 6, *Theogeny* (=theological genetics, comparative history of religion, genetic theology); 7, *Glossogeny* (=linguistic genetics, comparative science of languages, the science of the evolution of language); 8, *Sophogeny* (=philosophical genetics, genetic philosophy, history of world-conceptions; especially of the modern conflict over the idea of evolution).

The beautiful task of writing a comprehensive *General History of Evolution* according to this program was assumed by a pupil of mine, one specially fitted for the undertaking, Dr. Heinrich Schmidt, librarian of the Phyletic Archives in Jena. These Archives contain a wealth of literary material, which I have been gathering for that purpose for fifty years, and it is to be hoped, therefore, that the important work will be brought to a satisfactory consummation.

Evolution and Sociology.—For sociology, the modern study of society, our monistic genetics is of great importance. In the last half century this young social science, the most general problems of which must find their solution in a new social philosophy, has acquired great significance as a branch of history, due especially to its manifold relations to other sciences—to theoretical

psychology and ethnology, and to practical ethics and politics. It is usually regarded in the dualistic sense as a higher "exclusively human" science and is associated with metaphysical psychology.

In our view it should be treated, like other so-called human sciences, including psychology, as a natural science, as a branch of physiology. Here, too, the phenomena must first be carefully established upon the basis of objective experience, must be investigated according to comparative and genetic methods, and then explained according to monistic principles. By this procedure the unprejudiced sociologist soon learns for a certainty that society is by no means the peculiar result of human adaptation (still less an institution bestowed from above by a personal God), nor is it confined to the higher animals alone. He finds that association in its lower stages is a function characterizing all life. Consequently, the social laws which the organisms follow in their evolution must be traced through the whole scale of life, down to the lowest forms; and it will become apparent that the social impulses or instincts are already existent in the one-celled protists, and spring from the mutual sympathy of homogeneous cells, from the social feelings and needs of elementary organisms of a kind. Out of these

have gradually unfolded the social inclinations and combinations of a higher order, such as the herds, communities, and states of higher animals, which finally gave rise to the social laws of human ethics.

Association and Morality.—The great advantages that the individuals composing a society derive from it—mutual aid, protection against danger, assurance of food supply—are the causes why the individual instinct of self-preservation is translated into the altruistic instinct of social preservation. The deepest grounds of morality may therefore be found in natural association.

If the balance between egoism and altruism is regarded as the most important principle of our Golden Rule, then it follows that these two strongest of the natural instincts were originally equally justified—in contradistinction to Christian morality, which rejects egoism entirely and would only recognize altruism as the basis of moral conduct. But evolution (original phylogeny as well as ontogeny that recapitulates it) proves that with advancing organization altruism (neighborly love) asserts itself more and more over egoism (self-love). The reconciliation of this conflict between the two rival instincts is brought about by the instinct of social preserva-

tion, that is, social egoism, proving itself to be a higher ethical principle than individual egoism.

In the smaller unit of the human family this is illustrated by parental devotion; in the state it is illustrated by love of country. The glorious patriotism that leads millions of brave Germans voluntarily to sacrifice their lives for the dear fatherland in this titanic world war is evidence not merely of a deeper insight into the value of the state but also of a more highly developed moral sense. The civilized man of the twentieth century with his all-round enlarged outlook has become convinced that welfare, true happiness and satisfaction are to be found not in the cultivation of pure egoism (as preached in its extreme form by Max Stirner, and partly by Friedrich Nietzsche) but in mutual aid and in living peacefully together with one's fellow-men, in the family, in the community, and in the state. The more numerous and varied the demands of the social human being the more apparent are the advantages of altruism; and so he rises to a higher level of morality.

Gravitation and Affinity.—Since in our view there does not exist a sharp line of demarkation between anorgic and organic nature, since we believe rather that all vital phenomena in the

bios are to be traced ultimately to physical forces in the *anorgon,* we must inquire whether there is not something even in organic nature analogous to the social structure in organisms. The question receives its answer in our psychomatics, which shows that primitive forms of sensation or feeling (*æsthesis*) are common to all bodies in nature, and that this psychom (or "world-soul" in the physical sense) is the third general attribute of all substance (matter and energy being the other two).

As regards the problem of eternity we thus arrive at the doctrine of the Trinity of Substance explained above. The world-soul which expresses itself in the changing primal states of attraction and repulsion—positive and negative tropism—is as eternal and indestructible as matter and force, both of which are inseparably connected with it. The great law of gravitation, which determines the eternal revolutions of the cosmic bodies as well as the fall of the apple from the tree, is explained by the assumption that the molecules of the mass mutually feel their relative *quantity* and that a primitive pleasurable feeling impels them to social combination. In the same way the universal principle of chemical affinity is made intelligible by the assumption that the atoms of the mass feel their distinct *quality.* The

inclination for a special kind of substance, related to a feeling of pleasure of the lowest order, prompts them to combine with it, while they behave indifferently towards substances of another kind. The old doctrine of the "love and hate of the elements" propounded two thousand four hundred years ago by Empedocles thus receives its corroboration. On the other hand, this "associative instinct" of the anorgic bodies forms the direct transition to the lowest social instincts of the organisms. (Cf. *Wonders of Life,* 1904, chapter xiii, and *God-Nature,* 1914, pp. 36, 37.)

Cellular Sociology.—The cell theory has been commonly considered one of the most important and fruitful branches of biology ever since its foundation seventy-seven years ago (1838) by the great botanist, Schleiden of Jena. Schleiden proved that the bodies of most plants are composed of microscopic elements which build up the organs like the "cells" of a honeycomb. Only the lowest plants (*algæ*) are of simple construction, having the value of a single cell. Soon afterwards it was found that the animal bodies were made up in the same way. Brücke pointed out especially that these "elementary organisms" were physiologically independent individuals. Rudolf Virchow recognized their patho-

logic significance and traced disease to the abnormal modifications of cells. Sieboldt was the first to discover that the lowest animals (*infusoria*) were also unicellular, and called them primitive animals (*protozoa*). I have myself later (1866) united all the one-celled organisms, both the primitive plants (*protophytes*) and the primitive animals (*protozoa*), in a separate kingdom of protista (=*unicellulars*) as contrasted with the histona (=tissue organisms), multicellular and tissue-forming organisms (*metaphytes,* tissue plants; and *metazoa,* tissue animals).

The protists form no tissue; they remain permanently on the first and lowest stage of organic individuality, the simple cell. The histona, on the other hand, rise to the second and higher stage by building up tissues out of the many socially combined cells, and from these the manifold organs. But at the beginning of their individual existence, at the stage of the fertilized ovum, or cytula, the histona too (from the lowest metazoa up to man) are one-celled animals. It is only by repeated cleavage that this simple stem-cell gives rise in the course of the ontogenetic development to the numerous cell generations composing the tissue—according to our fundamental biogenetic law, the palingenetic repetition (determined by

heredity) of the corresponding process in the original history of the stem.

The biologic relation of the cells to the tissues and organs of the histona is the same as that which exists among the higher animals between the individuals and the community of which they are the component parts. Each cell, though autonomous, is subordinated to the body as a whole; in the same way in the societies of bees, ants, and termites, in the vertebrate herds and the human state, each individual is subordinate to the social body of which he is a member. Our own human frame is really a cell-state. Just as each cell is, relatively, an independent physiological individuality, so it is also an independent psychological individuality, as I have shown in my Vienna Concordia lecture (*Cell-Souls and Soul-Cells*) as long ago as 1878. The phenomena of association and division of labor in the building up of the histona are not explicable on any other assumption than that each single cell possesses an individual cell-soul, an individual energy manifested in its movements, and a psychom manifested in its sensations.

Cellular and Histonal Ethics.—Comparative biology and the monistic doctrine of evolution grounded thereon have led to the discovery

that the progress of organization in the animal kingdom as well as in the plant kingdom is chiefly dependent, on the one hand, on the increase, association and extension of division of labor of the component elements; on the other hand, on heightened integration or centralization, on the increasing strength of a central power controlling the whole (nervous system of the higher animals). In this view the origin of the cell communities (*cœnobia*) is of great importance. "Cell-societies" are found even among the lower groups of the protists both in the protophytes (*volvocineæ, diatoma*) and the protozoa (*magosphæra, vorticella*).

The principal forms of these cell communities are mentioned in the seventh chapter of my *Wonders of Life,* which deals at length with the important question (usually neglected by biologists) of "life-unities," of the different stages of individuality in organisms. The formation of cœnobia by the protists is the introduction to tissue formation by the histona. With the union of the cells into colonies arise the first beginnings of morality. We may therefore speak of an elementary cellular ethics of protists as contrasted with the histonal ethics of the multicellular, tissue-forming organisms. To Wilhelm Kleinsorgen belongs the credit of an exhaustive treatment of

this subject in his very suggestive work, *Cellular Ethics as the Modern Imitation of Christ: Principles of a New Life* (Leipzig, 1912). He dwells especially on the significance of love in the building up of society and the development of its ethics.

The spherical cœnobia present a particularly interesting form of cell community. They are hollow spheres with a thin wall consisting of a single epithelial layer of homogeneous, closely united cells. Such communities are found among the protophytes in *volvox* and *halosphæra,* and among the protozoa in *magosphæra* and *synura.* Their form reappears in all metazoa in the temporary embryonic stage of the blastula, the "germ-blast," which by gastrulation gives rise to the significant germ-form of the gastrula. Its one-layered cell wall is the blastoderm: the ground-work from which the germ layers, and from these the tissues, of all metazoa develop.

As soon as we have obtained a correct idea of the psychom, of unconscious cell-sensation, and grasped its real significance, we shall easily understand the origin of histonal ethics from cellular ethics and the gradual evolution of cellular ethics as a mechanical process.

Vertebrates and Articulates.—Next to the

vertebrate stem from which our own race has sprung there rises from the multitude of the lower vertebrate animals, another gigantic stem, the articulata. This stem, the richest in forms of the whole animal kingdom, is of great interest in respect of many questions, especially the doctrine of evolution; so that we must cast at least a hasty glance at its sociological, and related psychological importance.

The articulate stem, as Cuvier with keen far-seeing eye first discerned in 1812, contains four large classes. The oldest and lowest of these are the ringed worms (*annelida*). From these have sprung, in two divergent lines, the three higher classes—the gill-breathing crustaceans, the eight-legged, air-breathing arachnids, and the winged, six-legged insects. In each of these three multiform classes we find a long scale of families, rising from very simple, lowly-organized forms through numerous intermediate stages to greatly developed animals on a high level of intelligence. Both among the crustaceans and the spiders and insects there are a large number of extremely intelligent articulates whose remarkable sensuous and psychic activity is in no respect inferior to that of the higher vertebrates. It is to be noted that these two stems, the externally jointed articulata and the internally jointed vertebrata, are

not directly related but have developed independently from different stem roots of the worms (*Vermalia*). The brain, the central organ of psychic activity, is very different in the two stems, being connected in the articulates with a ventral marrow and in the vertebrates with a spinal marrow.

Comparative psychology, however, shows so much similarity between the two stems and such wonderful intellectual achievements, especially on the higher levels of development, that the intelligence of certain groups of articulates has often been placed on a parallel with man's intelligence. This is especially true of those higher insects whose social progress has led to the formation of real animal states, the monarchical state of the bees, and the democratic state of the ants and termites. Through extensive division of labor and through a high degree of organization and integration, social combinations have evolved among them in no way inferior to the structure of human society. The workers build extremely artistic dwellings and store up supplies of food, gardeners cultivate vegetable gardens (fungi), cattle-raisers keep aphides whose secretion, the honey-dew, is used as milk. Others take care of the young and their education. Favored women (queens) and men (drones) of a special form

take care of propagation. Soldiers serve as armed fighters for the defense of the tribe. Different species of ants fight with each other in bloody wars. Some have even accustomed themselves to slave-holding.

To be logical, dualistic psychology should assume the same personal immortality of the highly civilized ant as it does of the human being, whereas the remarkable psychic functions of animals possessing a great degree of intellectual development are usually looked upon as instincts which a wise Creator, on the creation of each individual species, implanted in that species for its special purpose in life. However, these antiquated anthropistic notions have now been abandoned, along with the whole creation myth. The so-called instincts, we now know, are to be regarded as psychic habits originally acquired through adaptation, then transferred by heredity to succeeding generations, and strengthened. (Cf. *Natural History of Creation,* chapter xxix.)

The Future of Evolution.—Considering the magnificent strides that the idea of evolution has made in the last half century in all branches of human knowledge, we feel reasonably confident that it will succeed in leading suffering mankind out of the chaos of the present insane world

war up to a higher stage of civilization and happiness. We feel confident of this because the knowledge we have gained of the general cosmic laws (foremost, the Law of Substance), and the firm foundation of the monistic theory of evolution (foremost, the solution of the Cardinal Problem), have led us to a conception of the universe so exalted as to have seemed impossible even in the nineteenth century. And simultaneously with this marvelous development of our rational monistic philosophy has developed its practical application to the humane conduct of life giving rise to the rational monistic religion which has attained to a height scarcely dreamed of before.

It is true that the progress of civilization which we would wish unbroken has suffered a thousand interruptions from the horrors of the present war, and there have been painful relapses into barbarisms. Yet all in all the beneficial effects of progressive development outweigh the injurious effects of the regressive development during the war. The average historical progress of humanity and of all organic life resembles the famous Echternach dancing procession—three steps forwards, two steps backwards—one step still remaining in favor of progress. The terrors of the French revolution a hundred and twenty years

ago were atoned for by the mighty progress which civil and political liberty made because the feudal system of absolutism and social class prejudices was destroyed. We may confidently hope that the present world war, a much more stupendous revolution than the French revolution, for all the violence it has wrought to our conceptions of human love and national rights, will nevertheless result in a new era of higher cultural progress.

This progress will first manifest itself rather in externals, in a grand shifting of international relations, both political and economical. But permanently the inner reforms will be of greater importance. These will spring from an enlarged knowledge of international civilization and an understanding of the various national characters. Legitimate national egoism combined with international altruism will learn more and more to follow the precepts of the Golden Rule.

Hopes of Peace.—The longer the terrible war of the nations lasts and the greater the values which it destroys in human lives, in cultural acquisitions and in material possessions, the more urgent grows the desire on all sides for the immediate establishment of peace. But this peace must be a lasting peace and make the repetition of the inhuman horrors which this war has brought

impossible for centuries, if not for ever. In 1795 Kant, in *For Permanent Peace,* showed that it should be the aim of higher civilization to establish an international condition of peace in place of the constant condition of warfare of the savage races. Within the past years various peace societies have been organized for the realization of this beautiful idea. A special Nobel prize is annually awarded to authors for the best work on peace. Of all the rulers it was the Russian czar who established the famous "Peace Palace" in The Hague—the Russian czar who actually made the first move in the world war, mobilizing his millions of troops at the end of July, 1914. Since then the old controversy as to whether peace between the nations is or is not possible has acquired new force. I myself am on principle a pacifist. For a number of years I have belonged to several peace societies in Germany, Austria, France, and England, which carried on a propaganda against war.

Our aim is to prevent the inevitable but bloodless "competitive struggle" from degenerating into a bloody and murderous "struggle for existence." The higher civilized nations should exercise mutual tolerance towards each other and combine for higher common cultural work in the service of true humanity. I do not see why it

should not be possible in the end to abolish the application of rude force between hostile competitive nations and replace it by rational conciliation or a neutral court of arbitration. Have we not almost completely abolished the notorious law of the strong hand and of blood revenge? Have we not succeeded in practically eliminating the duel, which is meaningless unless one believes in the superstition of a divine judgment? And this has been done despite the false Middle Age conception of honor that still persists among the higher classes, especially the military caste and certain student societies that try to maintain the pernicious custom. So I do hope that sooner or later we shall actually succeed in establishing a lasting, even though not an ever-lasting, condition of peace among the more highly developed civilized nations. But this cannot come about before practical reason shall have asserted itself sufficiently to show the warring nations the folly and evil of reciprocal murder, nor before the neutral court of arbitration shall have acquired the moral authority and necessary power to enforce its rational decisions.

Freedom of Thought.—While the external readjustment of Europe and the relations of Germany to the other states is still largely hidden

in the mist of the future, the most important aims of its internal reforms can already be clearly foretold. From the general lofty standpoint of pure reason, the recognized principles of purified morality that civilized men have so long striven to follow in their narrow personal relations should also become the norm within and without the state. It should guide the conduct of the different social classes toward each other, and hold equally in international relations. The most important of all these ethical principles is the old, old Golden Rule of morals.

For a fuller expression of my ideas on this point, I would refer the reader to *The Riddle of the Universe,* Chapter XIX, and would especially emphasize my views concerning the *Kultur-Kampf,* the necessity for school reform, and the importance of establishing upon an improved basis the reciprocal relations between school, church, and state. From my free-thinking monistic point of view I regard the separation of school and church and of state and church as highly desirable. It was accomplished long ago in Holland and the United States, and recently in France, proving beneficial to all concerned. I do not advocate the complete elimination of religious instruction. On the contrary, we are striving to have our monistic religion (in the sense ex-

plained above) developed for the natural ethical upbringing of the young, especially since in its most important principles, human love and tolerance, it is in agreement with the essential moral teachings of Christianity. The one thing we object to is teaching the Christian doctrines to the children in the schools as divine revelations. The Christian doctrines are nothing but the inventions of mythology and poetry; they are in direct conflict with the results of modern science.

There is no reason why the Christian faith should not find a place in the school curriculum along with the other mythologies. It should be taught as part of the history of comparative religion. But the obligatory instruction of the young in blind faith in the miracle stories of the Old and New Testaments must cease in German schools. This is a point that cannot be too strongly emphasized. Biblical superstition directly contradicts reason; and leads to that tragic conflict of creeds which has worked so much havoc, and is still working havoc, especially in Germany, where the spiritual life is so intense and deep. "Freedom of thought," which the Marquis of Posa demanded in Schiller's *Don Carlos,* unfortunately still a desideratum in many German states and in Austria, should be one of our fundamental rights. We should follow the well-

known principle of Frederick II: "In my states every man can go to heaven in his own way." Perfect freedom of faith in intellectual life is as important and indispensable for the civilized man of the twentieth century as freedom of the seas is in political life and international trade.

THE HARVEST OF THE WORLD WAR.—In conclusion, the general question naturally arises, "What results will accrue to the whole civilized world from this unparalleled conflict of the nations? What noble fruits will spring from the ghastly battlefields of Europe fertilized with the blood of millions of human beings? What permanent good will develop out of this titanic 'struggle for existence' in which the mightiest nations of civilization have been engaged for the past fifteen months in an attempt to annihilate each other?" Our answer to this great question is neither so pessimistic that we fear the extinction of our hard-earned civilization, nor is it so optimistic that we look forward to an approaching golden era of sheer happiness and peace. Proceeding from the realistic point of view of our monistic natural philosophy, we recognize in the present world catastrophe rather one of those turning-points in the history of mankind at which, under the combined weight of prodigious

progress and incisive chance, there will arise out of the ruins of the "good old times" new forms of national life.

The unique advances in science made in the last century, particularly in acquiring a deeper knowledge of nature, opened up the eyes of humanity, either utterly blind or merely groping in the obscurity of haze, and revealed the true value of terrestrial life in the clear light of the sun. Science has demonstrated the evil effects of sanctified superstition and of the unreason resting thereon. It has convinced us that only by reason and science, "man's highest potency," can the truth be learned and higher culture promoted.

Of the bountiful fruits that science has yielded, the highest is the all-governing "law of substance," the principle of the indestructibility of matter, energy, and psychom. And directly connected with it is the general law of the constant metamorphosis of the cosmos, the principle of the evanescence of all the individual separate parts of the world. The universe as a whole exists in eternity; not in eternal rest, but in eternal motion, in uninterrupted "becoming and passing away."

"The times change, the old falls to decay,
And new life rises from the crumbled ruins."

Another expression for it is our thesis, the *Perpetual Motion of the Universe* (1899). To the thinking civilized man of to-day the observation and discovery of the countless marvels of this eternal life-process is an inexhaustible source of purest joy, and the most certain way of arriving at it is through our modern theory of evolution.

APPENDIX

[In the German edition of *Eternity* the following matter occurs in the body of the book. The excuse for gathering here, under the head of an Appendix, these vivacious comments of a patriotic German on the turpitude of America and England, is that the reader might regard them as an interruption of the scientific, philosophic and religious discussion which constitutes the main interest of the work.]

No doubt a large part of this Britannic Christianity is sincere and really contributes to the refinement of life and customs, but by far the larger part of it is perfunctory. The English go through their religious exercises without warm inward participation, as a matter of habit, or for purposes quite unspiritual and worldly. Indeed, a great deal of English religious practice is downright, deliberate hypocrisy. The surface appearance of piety, the devout speech and demeanor, contrast sharply with the egotistic spirit, the rottenness of character within. Now what attitude does this lofty and much-vaunted "English Christianity" take to this horrible war, for which the pious island state alone is to blame? Are not all the bloody events which we have been witnessing since the war began, all the human losses and hos-

HAECKEL IN 1914
After an accident which injured his hip

tile actions from which millions of people are suffering daily, in the most glaring contradiction to the precepts of Christian love which flow so unceasingly and copiously from Great Britain's mouth? And how unconscionably the English press has slandered and vilified all its opponents, especially the German people! Never since the beginning of civilization has such an orgy of lies and calumnies, of deceit and hypocrisy, run riot as that which "godly" England has indulged in throughout this world war in the name of the trinitarian Christian God. This shameless hypocrisy must seem all the more repulsive, since everyone familiar with the facts knows that this British Christian God is in truth no other than the Bank of England, the sacred "golden calf," the idolatrous cult of which is the chief object of panbritism, of England's world-dominion.

. . . . . .

The President of the United States, Professor Wilson, not only declares himself in favor of American neutrality in principle, but as a zealous friend of peace sets aside special days for prayer and arranges special divine services to induce a speedy conclusion of the world war. At the same time in action he does everything possible to prolong the war. He permits the American manu-

facturers to supply our enemies with unlimited quantities of arms and munitions. He favors England's infamous plan to starve Germany out by cutting off all supplies from abroad. In his "peace speeches" he goes to such lengths of political and religious hypocrisy as to yield in no respect to the English "multi-million murderer," Sir Edward Grey. These are the beautiful fruits of Christian dollarism, of the lust for gold and profits, which unfortunately has become the highest expression of "Christian love" in Columbania.

. . . . . .

The present holy war is not like the holy wars of the past, a religious strife between the creeds of the three great Mediterranean religions, the Jewish, Christian and the Mohammedan. It is rather our common goal in this holy war of liberty to secure above all the freedom of the seas, to emancipate ourselves from the intolerable tyrrany of Great Britain, which claims absolute supremacy over all the sea area of the world, almost two-thirds of the surface of the earth.

For the rest, the Mohammedan nations of Asia and Africa under the yoke of English slavery have found out precisely the true moral value of English pseudo-Christianity. One need but think of the famines and the cruelly suppressed upris-

ings in India, of the opium trade in China, the Boer war in South Africa. And now through England's barbarous methods of conducting war, setting at defiance all "Christian love," through the unparalleled fabric of lies, hypocrisy and brutality which she has woven, it has become clear to the other nations also what they have to expect in the future from the rule of force by the English "brothers in Christ." Thus the "war to the knife" which Great Britain in her megalomania has forced upon us has really become a "holy war" for the new triple alliance, a war for truth and right, for humane customs and humanity.

. . . . . .

Organization and Militarism.—Among the serious charges against Germany that England has spread broadcast to justify her attack upon us is the accusation of "militarism" and militarism's alleged concomitant, slavery; which accusation has found credence not only among the allies but also among the neutral nations, and has been used successfully to intensify an unfriendly attitude towards us on the part of the neutrals. I feel I cannot let this go without comment, especially as I have several times spoken against certain of the outgrowths of militarism. Militarism is a slogan, which, like many another, is used in

different senses. There is a justifiable and healthy element in militarism. In the present world war it is this element that has saved our Fatherland from a colossal superior power. Militarism in this sense is nothing but a well-organized instrument of defense. Every single organism as well as every state is threatened by enemies and jealous neighbors, and must protect itself by the best possible weapons and measures of defense. As such the Prussian army is recognized to be a model. And it is fitting that on this day, of my writing, October 20, 1915, which is the fifth centennial of the rule of the Hohenzollerns, recognition be given the famous heads of that royal house for their indefatigable efforts to build up a strong army. Foremost is the great monistic philosopher of Sansouci, Frederick the Great, who, one hundred and fifty years ago, brought to a victorious conclusion a war against a "world of enemies." And we also owe gratitude to Kaiser Wilhelm the First, who founded the new German empire forty-four years ago with the aid of Bismarck's incomparable statecraft. By establishing at exactly the right time the compulsory military service that his father had introduced in the war of liberation a hundred years before, he created a national army for defense in the best sense. Most of the civilized nations of Europe

have imitated the measure. The only ones to reject it have been the English who have held it to be a limitation of individual liberty. Now that their forlorn system of voluntary service has failed, they begin to see the necessity of it.

However, we must be careful to differentiate between a rational militarism and what is justly condemned as idle, expensive soldiers' play. I refer to the overdoing of army equipment—extravagant trappings for a great number of different regiments, brilliant uniforms, swashbuckling about the "glorious army," constant parading and waving of flags and celebrations of historical victories. It is pomp and display that costs the state much money, makes the soldiers vain and foppish, and offends the honor of the other nations. It has no value whatever for the real organization and efficiency of the army. Now that Darwin's principle of "protective coloration" has been introduced and the gay uniforms have been replaced by the simple field gray, this pseudo-militarism has lost all meaning.

Evolution and Politics.—Just as the state is but a higher, ordered form of society, so politics, or the science of the state, is but a special branch of sociology in the larger sense. Consequently it is subject to the same general laws of evolu-

tion. But its problems are more difficult, as a much more comprehensive knowledge of all the conditions and special questions involved are necessary; the more so the larger the state and the more complex its structure. This is why educated men entertain such widely divergent opinions and desires in politics both as a science and as an art, despite the fact that everyone reads his daily newspaper and is compelled by his needs to occupy himself with political and social questions. Furthermore, every citizen from early youth up has become habituated by his national training to a more or less one-sided view of things, so that he is apt to regard the institutions of his own country as normal and those of other countries as defective or abortive.

This deplorable condition has been strikingly intensified in the present war. One and the same fact, one and the same problem, appears in a totally different light to the various nations involved. On the whole the educated German is certainly less prejudiced and more capable of arriving at a fair judgment both on account of his better schooling and his cosmopolitan interests and international predispositions. On the other hand the Englishman's vision is so obscured by his egotistic megalomania, the Frenchman's by his extravagant national vanity (*"la grande na-*

tion"), the Italian's by his pride in ancient Rome, once the ruler of the world, the Russian's by his Panslavistic mania, that from their narrow standpoint they judge of most of the political events very one-sidedly and often quite wrongly.

This explains the regrettable failure of every endeavor to arrive at an international understanding. As I myself have for many years taken part in work for international conciliation, having been a member of "arbitration societies" in England, France and Italy, I know from my own experience what great practical obstacles are put in the way of these ideal endeavors. It is my conviction that here too permanent progress can be attained only when the fundamental principles of evolution, of genetic anthropology and sociology, and of the monistic philosophy based thereon, are better understood and more generally recognized.

GERMANY AND ENGLAND.—For a great number of years many of our distinguished statesmen and well-intentioned politicians have directed their efforts towards working out a policy by which it would be possible to arrive at a peaceful understanding with our neighbors. Of these efforts none were so important and held out such promise of success as those aiming to establish

peaceful relations with England. Both nations, Germany and England, have a common Germanistic culture. In science, art, technical development and humanitarian endeavors they have never departed so widely as to belie their basic kinship. This has given rise to the hope, particularly within the last forty years, since the rebirth of the German Empire and the disciplining of France, that the alliance of the two Germanistic sister nations would not only accrue to their mutual benefit and well-being, but would also be a guarantee to the world peace that is desired by all nations. Germany's army as the strongest power on land, England's navy as the strongest power on sea, could, when united, bring the gift of permanent peace and progress to the whole civilized world, especially since Columbania, the United States of America, in which the English and German elements are to a large extent commingled, would have joined this great Eastern and Western alliance. This beautiful dream has now vanished, thanks to the deep-rooted, brutal national egoism of the English. And unfortunately there is no hope that it will be revived for a long time to come. For the consequences of this war, "the greatest crime in all history," recklessly brought upon the world by England, are so horrible, the wounds it is inflicting upon civi-

lized humanity are so deep, that a real reconciliation between Germany, who has been attacked, and her treacherous, murderous English brother is not to be thought of for some time. At least the present generation of continental Europe will not be able to extend the hand of reconciliation to England, the present generation that ever since the war started has been witnessing daily Great Britain's barbarous and infamous methods of warfare—the unparalleled mass murder she has been practicing, the shameless mendacity and hypocrisy of English politics, her outrageous treatment of prisoners and wounded. Before friendship between the two nations can be restored, a new generation must come which shall see the re-establishment of tolerance and humane customs, the re-establishment of the rights of the individual and the rights of nations, now being trampled upon by the allies.

The Blood-guiltiness in the World War. —In the first months after the surprising outbreak of the war, in August and September, 1914, opinions as to what were the real causes and where the guilt belonged were still widely divergent. Farsighted politicians and historians who had closely followed the complicated European situation during the last thirty years, especially

since the beginning of the century, expressed the conviction that the deep, underlying cause was the jealousy and envy with which our eastern and western neighbors viewed the prosperity and rise of the newly united German Empire. In Germany's former state of dismemberment and political impotence, our neighbors had become accustomed to look down upon us as a subordinate power of the second rank that every close-by nation could exploit for its own purpose. That Germany should try to make herself a great power on an equal footing with other great powers, that like them she should try to acquire colonies and hold her just share in the world's trade, was a source of vexation to our enemies east and west. It deprived them of their sleep, and turned England into our fiercest enemy, England, a Germanic sister-nation, belonging to the same stem as ourselves. The king of England—and this is the most tragic thing of all—the king of England, Edward VII, a prince of German blood, uncle of our Kaiser Wilhelm II, made himself the promoter of this brotherly hatred, and for ten years bent his chief efforts upon the hostile "encirclement" of Germany.

Immediately after the outbreak of the war (August 12, 1914) I have tried to elucidate these facts in a small pamphlet, *England's Bloodguilti-*

ness in the World War, which received a wide circulation (Eisenach, *Jakobi's Verlag*). In a second article, *World War and Natural History* (*Nord und Süd*, November, 1914), I have treated the war from a Darwinian standpoint, pointing out the twofold significance of the "struggle for existence" (peaceful "competitive struggle," and hostile "struggle for existence"). Since then, as is known, many facts have come to light (especially the famous disclosures of the Belgian state archives) which prove to a certainty that England alone bears the guilt of this "greatest crime in history," and that it has been preparing for more than forty years to destroy its dangerous German competitor; and, as if any more proof were necessary, English cabinet ministers and members of Parliament, towards the close of last year, made naïve confessions showing their guilt.

England's World Domination.—The prodigious, rapidly moving events of the war have brought out and more clearly that what England, the most powerful pirate state in the world, is aiming at is not only to maintain unlimited dominion of the seas and control of all her colonies throughout the world, but also, hand in hand with this, to exploit all the other nations for her

own benefit, regardless of their interests. The magnitude of such brutal national egoism must command admiration; so too the circumambient vision and refined cunning with which Great Britain throughout the centuries built up and consolidated her world-empire.

I myself have always been ready to recognize the debt of gratitude the world owes to the little British island empire for her great contributions to civilization, made possible by the splendid advantages she enjoys in her insular selection and geographical connections. Moreover, my work on Darwinism, and my friendship with Darwin, Huxley, Lyell, John Murray, and many other eminent scientists, have for fifty years brought me into the most pleasant and fruitful relations with England and Scotland. When in London, in 1866, I for the first time saw the rich treasures of art and science gathered there, I was filled with admiration for the magnificent cultural attainments of the English and the superior ability they displayed in practical organizing work. Ten years later, in Glasgow and Edinburgh, I was privileged to examine the marvelous collections of the Challenger Expedition, which opened up the new world of the deep sea to scientific investigation. At the request of its director I undertook to elaborate a large part of it myself. The work

occupied me twelve years and was among the most grateful tasks I have ever done in my special field, zoology. The outcome was several large monographs on Radiolaria, Sponges, Medusæ, and Siphonophora, illustrated with several hundred plates through the liberality of the management. And on my first two journeys to the tropics, the first in Ceylon in 1881, the second one in Singapore in 1900, I learned to admire the extraordinary skill of the English in colonial administration and the government of the immense Indian Empire. In fact, Germans have accused me of greatly overestimating the British spirit of enterprise and investigation. All the deeper now is my regret that England's egoistic envy and boundless megalomania have made us her bitterest enemy.

England's Megalomania.—The signal success with which England has for centuries exploited her world-supremacy is rooted in those external and internal conditions the significance of which has come to light more clearly than ever before in the present world war. Considered externally, the little English island empire appears as an unassailable sea fortress whose invincible, gigantic navy safely protected in numerous excellent harbors renders direct invasion from

without impossible. Furthermore, through her enormous colonial possessions, her empire throughout the world, she commands gold resources that seem to be inexhaustible.

As to the internal cause of her power, it is proverbial that her politics are abominable, her diplomacy deceitful, and her disregard of the rights of other nations supreme. Compared with the mendacity of "perfidious Albion," the notorious *"Punica fides"* of the ancient Carthaginians dwindles into insignificance.

Right after the beginning of the war England opened up a campaign of lies against Germany. Shameless calumnies and cunning distortion of the truth placed us in an entirely false light in the eyes of the rest of the civilized world. As all our communications were cut off, we were for several months without the means of properly refuting the false reports spread daily in the press. In that way they had the chance to prove all the more effective. Later, when the ninety-three noted German scholars published their statement and cut the threads of this mesh of lies by showing up the true origin of the war, one hundred and twenty English scholars issued a rejoinder so incredibly distorting the facts that it can only be accounted for as another case of English megalomania.

The bulk of the English population, as a matter of fact, live in the pathologic delusion that they, and they alone, are the true promoters of civilization and education; which superlative national pride is intensified by their ignorance of other nations. The English language is the only right language. English customs the only right customs—a claim, we all know, that the Englishman sets up wherever he goes. The languages and characters of other nations he either never learns at all or but imperfectly.

England's Piracy.—Naval war or piracy with all its attendant violence and forays is the most reckless form of warfare. Withal, it exercises a peculiarly romantic fascination on those who engage in it, partly because of its hazards, partly because of the safety, even security, afforded by a good port, or an isolated island, or an inaccessible rocky coast with secret nooks and crannies. That is why bold and intelligent coast dwellers have for centuries engaged in the lucrative and adventurous occupation of piracy. Often as a result of raids on a larger scale pirates have acquired important political possessions. Ever since ancient times piracy has been a favorite theme with poets and romance writers. There are the Iliad and the

Odyssey; there are the heroic expeditions of the Greek, Phœnician, Carthaginian, and Roman pirates.

During the period of the eighth to the eleventh centuries, the bold Normans raided the coasts of the British Isles and the western coast of the Continent. In the Middle Ages the Turkish and Saracen corsairs attacked the Mediterranean and the western shores of Europe. In Italy, Spain, and other Mediterranean coast-lands there is still many an old watch-tower bearing testimony to the terror with which these sudden piratical descents inspired the inhabitants. They were robbed of their possessions, carried off prisoners and used as slaves. In the sixteenth and seventeenth centuries the British and French bucaneers became famous for their raids on West India and the eastern coast of North America; in the eighteenth century it was the filibusters of the North Atlantic. In 1670 an English bucaneer succeeded in conquering Panama. His name was Morgan, the same as our well-known contemporary's, the New York financier, heir of one of the multimillionaires who founded the gigantic steel trust. By supplying England with enormous quantities of ammunition he has caused the killing of thousands of German soldiers. At about the same time as the

New York banker's namesake was busy in Panama, a reduced French nobleman, Gramont, was plundering Mexico. Even to-day many Chinese and Japanese ships are still doing a thriving business pirating in the Far East.

Yet the combined achievements of two thousand years of these and other pirates are insignificant compared to the magnificent successes that Great Britain, the most powerful and the most brutal of all the pirate states, has had in every quarter of the globe. And the foundations of the larger part of her world dominion were laid in the reckless brutality with which she has attacked and plundered other countries. Her audacity, however, has been so superb, her diplomacy generally so shrewd, that it is difficult to withhold admiration. We Germans deem it a special merit of our submarine warfare that it has interfered with at least some of the activity of this robber band.

England's Barbarism.—In the campaign of lies that England has been successfully carrying on against us in every part of the world through her press and her Exchange, the most serious and most effective charge is that we are "barbarous" in our methods of warfare—a malicious accusation based on misrepresentations and fal-

sified photographs, a boomerang recoiling upon England herself, as any impartial judge acquainted with both the English and the German character would know.

Throughout this war the soldiers, statesmen, and journalists of Great Britain have repeatedly proved that they are absolutely indifferent to the principles of national rights. Their national egoism has so blinded them that they cannot even see the rights of other nations.

One needs but read the history of the English colonial wars to see how this "most Christian of all nations" treats her enemies. The inhumanity, the cold-hearted cruelty of it is characteristically represented in the famous Indian war pictures of the great Russian painter Verestchagin—a battery of English cannon planted in a row, with a live prince or dignitary tied to the mouth of each cannon; the artillery men standing by cold and quiet, patiently awaiting the moment when the order will finally be given to shoot and the torn bodies of the victims, already half-worried to death, will leap into the air. These Indian criminals have but fulfilled their duty and defended their country against British piracy. Moreover, they are Aryan Indians, not black Kafirs or Senegal Negroes, like those the Quadruple Alliance is now putting in the field against us. They are

older sprouts of the same Indo-Germanic race from which the Anglo-Saxons on the one side of the Channel and the Teuto-Saxons on the other have descended. If the war were to end disastrously for us and Germany were to be divided and crushed according to England's wish (as is hopefully shown in some maps of the future drawn by our enemies), the "Germanic dominions" would fare no better than the subjugated Indians, Australians, South Africans, and Egyptians.

GERMANY'S NEWLAND.—Few people doubt that at the conclusion of peace the map of Europe will undergo vast changes and that the political boundary lines will be considerably shifted. But how, where, and when peace will be concluded, how the prodigiously complicated political problems of this problematic world war will be solved, no man can at present foretell. This much is certain, however, that the German people, without any false sentimentality, almost to a unit want Germany steadfastly to persevere until we have achieved a lasting success. The same wish has been repeatedly expressed in authoritative quarters of the Imperial Government. The peace we hope for must be enduring and must rest upon such a basis as to cure our jealous neighbors and

malicious enemies forever of the disposition to attack us.

Of course we cannot presume to lay down special terms of peace; but we may outline in a general way, as many have done before, the most important points to be considered when the time comes for making peace. We now hold considerable territory as valuable security—on the west, Belgium and the north of France; on the east, Poland and the Baltic Provinces. These rich countries were formerly German possessions. Antwerp must remain our stronghold on the North Sea and Riga on the Baltic Sea. The alliance we have succeeded in making with the Orient is extremely important for us at the present time (Berlin, Constantinople, the Bagdad Railway, etc.). At all events, when the treaty of peace is concluded we must demand a considerable extension of the German Empire.

In making this demand our motive is neither the greed nor the lust for gold that dominates England, mistress of the world, nor the national vanity of France with her mania for glory, nor the childish megalomania of Rome-crazed Italy, nor the insatiable hankering for territorial expansion of semi-barbarous Russia. It is simply this, that the German Empire being overpopulated, has urgent need to extend and strengthen its fron-

tiers which before the war were most unfavorable for it. It needs this, first, in order to be secure from future attacks by our stronger neighbors, and, second, in order not to lose the large numbers of German citizens who emigrate yearly from the too narrow confines of the fatherland, making "cultural manure" for other countries. The new provinces which we are going to annex are energetic and intractable, but with cautious, intelligent treatment they can be Germanized, or at least be made accessible to German culture, an important task that is not new for Germany. In former centuries she carried it on over a large extent of territory.

GERMAN COLONIES.—This all-embracing world war has taught us many important lessons. One of them, which is of special importance, is the growing conviction that the German Empire as a world power needs extensive colonies. Two hundred and fifty years ago the Great Elector had the farsightedness to recognize this political necessity, and the great founder of the new German Empire, Prince Bismarck, translated it into action in our time, in the face of persistent opposition from many shortsighted politicians. Of the various proposals recently made for the extension of the colonies which we have already acquired,

the one that holds out the best promise is that of founding a great German colonial empire in Middle Africa. Along with the possession of Belgium and its excellent port of Antwerp will also come the Congo State with its immense area and wealth of resources.

As a result of our tremendous efforts, our colonies in east and west Middle Africa are already prosperous. Then, if the Congo be added, we shall have a vast region, which the energy, industry, knowledge and intelligence of the German colonists can turn into an exceedingly profitable field of exploitation for us for centuries to come. England must not be permitted to carry out her magnificent scheme of establishing a world-wide empire on land as well as on sea by building direct lines of communication from the Cape to Cairo, and from the Niger to Irawadi. Egypt must be returned to its rightful owners, the Turks, from whom England grabbed it more than thirty years ago. So also must the Suez Canal, which should be placed under international administration. Great Britain must be driven out of Africa altogether. Cape Colony and the glorious island of Ceylon must be given back to Holland to whom they formerly belonged.

It should be one of the important aims of the rejuvenated and enlarged German Empire to re-

main always on the friendliest footing with Holland, Switzerland, and Scandinavia, neutral countries well disposed to Germany. There is great hope that the introduction of German culture and education will inaugurate an era of modern reform in the Ottoman Empire, especially since the more educated Turks have largely lost the religious fanaticism of earlier days. In a regenerated Turkey, aided by the cultural work of Germany, and also of Greece, Asia Minor, one of the most glorious countries of the world, twenty-five hundred years ago enjoying the highest Greek culture, can rise again to a flourishing state. So could the adjoining regions of the Euphrates, and Syria, and Palestine.

Freedom of the Seas.—A most important condition of peace, one in which all the nations are equally interested, is the re-establishment of free navigation on the ocean and a secure legal status in the relations between the sea-faring countries. But this can be achieved in only one of two ways, either by destroying Great Britain's rule of the seas, or else rendering it harmless. England's maritime tyranny has existed for centuries. Disregarding the legitimate claims of other nations, selfish, greedy, eager for dominion, she has sought to weaken or destroy the sea

power of any nation that came in competition with her. She has unscrupulously attacked and destroyed the fleets of France, Spain, Italy, Greece, Holland, and Denmark, of every nation in whom she discerned a dangerous competitor to her trade on any sea coast in the world. For years she has maintained absolute supremacy over the shores and ports, islands and fortifications of her colonies, surpassing all others in area and wealth.

Never have we been made to feel this so keenly as in the present world war. From the very outset England's maritime supremacy and her secure footing in all parts of the world have enabled her to isolate Germany and cut her off from all other countries. That our telegraphic communications have been destroyed is the one explanation we can find for the extraordinary effect of the huge campaign of lies against us, for our enemies' success in slandering and making us hated by the neutral nations. And yet Great Britain's maritime tyranny is just as much of a menace to the neutral nations as to us—in fact, just as much a menace to France, Italy, and the other English allies as well. In a given juncture, the British pirate state will deal with them as it has dealt with us. It will prohibit their competition in the world trade and make free navigation on sea impossible.

The vast area of sea covering nearly two-thirds of the surface of the globe should be the common possession of all mankind; it should never be allowed to become the private property of one seafaring nation. When in recent years English ministers have publicly claimed this monopoly, and in superb pride and confidence have made the threat that Great Britain will forever remain the one absolute mistress of the seas, they have presented but one more instance of blind British megalomania.

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